J. Will Harris.

PSYCHOLOGY

AND

PSYCHIC CULTURE

BY

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HALLECK'S PSYCHOLOGY.

E-P 20

Gratefully Dedicated

to

My Mother

PREFACE.

For several years the author has taught psychology under conditions which necessitated its presentation in as plain and as interesting a manner as possible. He has endeavored to impose the same conditions upon himself in writing this book. Psychological text-books have too often been a bundle of abstractions. It seems as if the human mind ought to have qualities that would interest the average person, whether young or old. After considerable experience, the author can testify that the leading truths of psychology can be given in an intelligible way to pupils under the age of twenty. He has aimed in this volume to present as much of the science as the general student will need.

Especial effort has been made to enliven the hard and dry facts of the science by employing illustrations and anecdotes to elucidate them. No one knows better than the psychologist that it is of little use to present the best of subjects in an unattractive way, because facts devoid of interesting features will not secure the attention.

The chapters on the application of psychological laws in the cultivation of the mental powers are a characteristic feature of this work. Laws are of little use unless they are applied; hence these chapters are of the utmost importance to all who have not passed the plastic age. Psychology, in order to be most effective for self-improvement,

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should be studied while the brain is still plastic, and hence earlier than is sometimes customary. By the age of thirty, a ton of effort will be required to effect a change which a pound could have secured earlier. It has been the constant purpose of the author in this work to make the study practically useful to the student.

This volume aims to present the latest ascertained facts of physiological, as well as of introspective, psychology. The student ought not to neglect the brief essentials of physiological psychology, for they will help him on the introspective side. No one can have a clear idea of the nervous mechanism at the threshold of will power, unless he can image a sensory stimulus flowing along an afferent nerve, pouring into a ganglion cell, and being reflected outward along a motor nerve. The few leading physiological facts, necessary to give the average person a groundwork for his images of the physical accompaniments of mental action, are very easily learned.

In some quarters an attempt has been made to present psychology without classification. This attempt has not proved successful, for no one has been able to avoid the terms which get all their meaning from the implied truths of classification. The student who begins the study of psychology in such a way will certainly be confused.

The author acknowledges indebtedness to much of the current literature on the subject, and to some of his former instructors at Yale. On the side of physiological psychology, the writer must thank, for repeated help in dissecting the brain and nervous system, the scholarly Demonstrator of Anatomy in the Louisville Medical College, Dr. August Schachner.

R. P. H.

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PSYCHOLOGY AND PSYCHIC CULTURE.

CHAPTER I.

THE NERVOUS MECHANISM AT THE DISPOSAL OF THE MIND.

The Scope and Importance of Psychology. — Psychology is a scientific study of the mind. All sciences presuppose the fact that the mind is subject to certain uniform laws; for all sciences are products of the mind. Mathematics, the laws of physics, the theories of evolution and of material philosophy, are mental products. If memory and thought work to-day differently from yesterday, we cannot depend on the results of our reasoning powers in any of the sciences. It is the important task of psychology to investigate mental laws.

All processes that affect and condition consciousness are, from one point of view or another, the subject matter of psychology. The mental powers cannot be trained intelligently without a knowledge of psychological laws.

Dependence of the Mind upon the Nervous System. — Marvelous as are the mind's achievements, we must note that it is as completely dependent upon the nervous system

as is a plant upon sun, rain, and air. Suppose that a child of intelligent parents were ushered into the world without a nerve leading from his otherwise perfect brain to any portion of his body, with no optic nerve to transmit the glorious sensations from the eye, no auditory nerve to conduct the vibrations of the mother's voice, no tactile nerves to convey the touch of a hand, no olfactory nerve to rouse the brain with the delicate aroma from the orchards and the wild flowers in spring, no gustatory, thermal, or muscular nerves. Could such a child live, as the years rolled on, the books of Shakespeare and of Milton would be opened in vain before the child's eyes. The wisest men might talk to him with utmost eloquence, all to no purpose. Nature could not whisper one of her inspiring truths into his deaf ear, could not light up that dark mind with a picture of the rainbow or of a human face.

No matter how perfect might be the child's brain and his inherited capacity for mental activities, his faculties would remain for this life shrouded in Egyptian darkness. Perception could give memory nothing to retain, and thought could not weave her matchless fabrics without materials.

Since nothing conditions the mind at the very outset more than the nervous system, it is necessary, before investigating the various mental activities, to turn our attention to the study of the nervous mechanism.

The Nervous System as a Transmitter of Stimuli. — It is the business of the nervous system to transmit the affections resulting from internal or external stimuli. This function of reporting stimuli may be compared with the machinery of an associated press agency, which gathers the

news of the world. The manager may be sitting on a dark night in his office in New York or London. He cannot see what is taking place in the rest of the world, but there is a click of the telegraph instrument, and he learns that an ocean steamer has been wrecked on the Irish coast. After a few moments' silence there is a sound from a different instrument, and he knows that a noted statesman is dead. Another instrument vibrates with a message that a certain city cannot be heard from. An earthquake or a cyclone is suspected, and people are anxious about their friends. The manager himself sends a dispatch asking for news, and he now illustrates the second capacity of the nervous system, that of transmitting commands by its own peculiar automatic power. But he telegraphs in vain, for the wires leading to the city are broken.

These telegraph wires are analogous to the nerves of the ear, eye, and other senses. It is the business of these nerves to report what is taking place in their own special world. The brain in its dark chamber can receive dispatches from them alone. If a man loses his sight, the optic nerves bring in no further news, and the case is similar to that of the distant city whose telegraphic communication has been broken by an earthquake or a cyclone.

We may liken the human brain to the manager of the news agency, for the nervous currents flow into the brain in a way analogous to that in which news is transmitted to him. Suppose there is in a room over this manager the editor of a great daily paper which receives its news from this association. The editor may suppress or color certain items. He may, from meager dispatches, draw inferences concerning the future of a party or the harm likely to be inflicted by a certain measure. This editor

would typify the active powers of the mind in its functions of imagination and thought.

Neurones. — The unit of the nervous system is called the *neurone*. This term designates both the cell body and all its outgrowths. Hence, the neurone includes (1) a body of protoplasmic matter, sometimes called a nerve cell, and (2) all outgrowths from that cell. The principal outgrowth is called an *axone*. The term *nerve fiber* is frequently applied to an axone, when it is considered by itself, apart from the cell. No harm can come from speaking of these axones as "nerve fibers" or from applying the term *nerves* to collections of two or more nerve fibers, if we remember that in every case they are outgrowths of nerve cells and that the term *neurone* is applied to both the cell and all its branches and that they together form a unit of the nervous system.

Of the importance of these neurones, Dr. M. Allen Starr says, "However complex the act, the physical basis of all nervous and mental diseases is the interaction of a series of neurones." The researches of psychiatrists have shown that a comparatively slight deviation from the normal development of certain brain neurones results in deficient intelligence or in some form of insanity.

The Nerves. — The nerves traverse every region of the body, just as telegraph wires thread a continent. Without some such method of transmission, the sensations of sight, hearing, touch, and the other special senses could, as we have seen, never reach the brain, nor could commands, such as to move the muscles, be sent out from it.

What seems to the eye a single nerve is frequently composed of an enormous number of nerve fibers. A patient

German counted, in the anterior nerve roots branching from a frog's spinal cord, over 11,000 separate nerve fibers. Each one of these is often well insulated by a sheath. Here we find another resemblance to a telegraphic appliance, for a great number of insulated wires often issue from a building in the same tube. There is not a single city with as many telegraph wires entering it as there are nerves running into the spinal cord and brain. Nerve fibers vary in size from about $\frac{1}{1200}$ to $\frac{1}{100000}$ of an inch in diameter.

When a toe is injured, a fire is seen, or a sound is heard, a message flashes along the proper nerve fiber. The delivery of this message is frequently but one part of the process. If some one stepped on our toes, the fact would not only be reported, but a command would be sent to the muscles to move the foot out of harm's way.

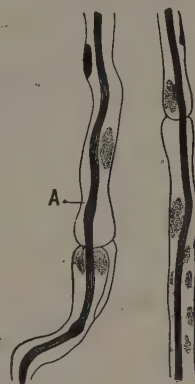

FIG. 1. — Nerve fibers. The dark interior portion marked *A*, is the axis cylinder. Surrounding this dark axis is the sheath. — Adapted from M'Kendrick.

Afferent and Efferent Nerves. — There are two classes of nerves with different functions. These nerves are called *afferent* (*ad*, to; *fero*, carry) and *efferent* (*ex*, out; *fero*). An afferent nerve conveys a stimulus from some part of the body to the central nervous system. An efferent nerve transmits from this system either an incentive to movement or some internally originated stimulus. Under the class of afferent nerves are *sensory* nerves, which are concerned in reporting sensations to the central nervous system. Efferent nerves include *motor* nerves, whose

function is to move the muscles of the body, under the direction of the central nervous system.

It is more important for the physiologist than for the psychologist to bear in mind that while afferent and efferent nerves comprise all classes, sensory and motor nerves do not, for there are nerves which regulate the size of the blood vessels and the nourishment of the body, control the secretions, and perform various other offices connected with transmitting stimuli, which are neither sensory nor motor. The psychologist is mainly concerned with sensory and motor nerves.

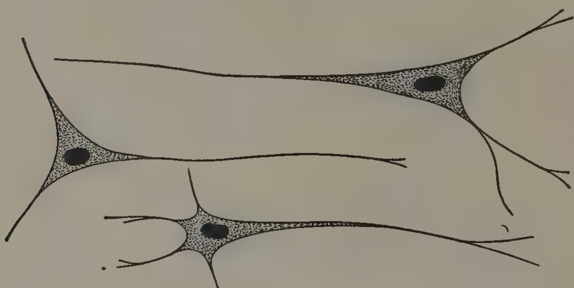

FIG. 2. — Pyramidal nerve cells found chiefly in the brain. — M'Kendrick.

When a man is consciously hurt, the sensory nerve reports the pain. The motor nerve carries a command to get out of the way of the cause if possible. If there were no motor nerves, a hand once clasped around a red-hot iron could not drop the metal, although the pain might be intense. The difference between the action of the motor and of the sensory nerves is well shown by the effects of a drug called *curare*. When the South American pierces his prey with an arrow dipped in this poison, the motor nerves are palsied, while the sensory nerves are unimpaired. In consequence, the animal suffers acutely without being able to

move a muscle. If a vivisector should administer curare to an animal, the sensory nerves would transmit all painful sensations, and of course it would feel every wound, but would be unable to stir because of palsied motor nerves.

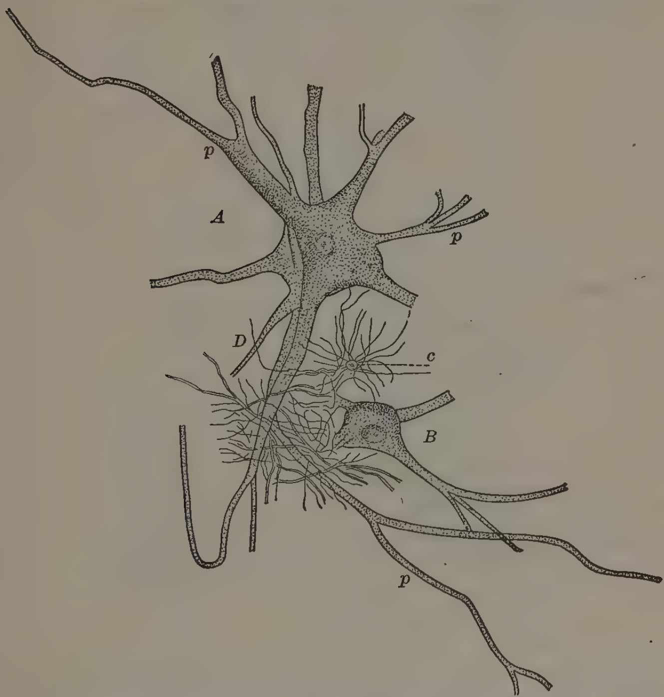

FIG. 3. — From a piece of spinal cord. *A* and *B*, ganglion cells; *D*, axis cylinder; *p*, protoplasmic process; *c*, neuroglia cells. — Ranvier from Edinger, Am. Ed.

Nerve Cells and Ganglia. — Nerve cells are bunches or knots of protoplasmic nerve matter, connected with nerve fibers. The nerve cells are of the most various shapes — cylindrical, caudate, pyramidal, etc.

A *ganglion* is an aggregation, or group, of nerve cells.

Each ganglion is in some respects a little brain. The spinal ganglia receive a sensory impulse and send out a motor dispatch without calling on the brain. On page 18 is explained why the coöperation of these is necessary for our mental as well as our physical welfare.

Central Nervous System.

The Spinal Cord. — A cord of nervous matter leaves the base of the skull and, protected by the spinal bones, extends

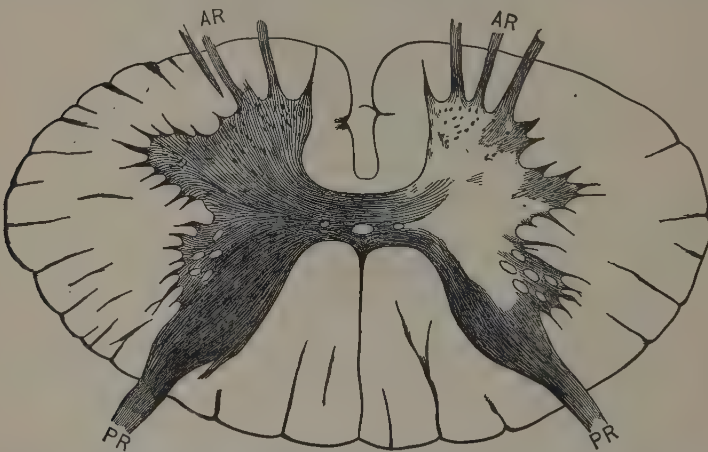

FIG. 4. — Transverse section of the spinal cord; in the center is the butterfly form of the gray matter surrounded by the white matter. *AR*, anterior roots of spinal nerves; *PR*, posterior roots. — Landois.

downward for about a foot and a half, in a person of average height. In front of the cord is a deep furrow, called the anterior fissure; in the rear is another groove, called the posterior fissure. These two fissures extend so far into the cord that they almost divide it into halves, leaving only a narrow bridge of nerve matter like the connecting bar in

the letter H, or, more exactly, like two crescents joined together. A transverse section of the spinal cord (see Fig. 4) will show two kinds of nerve substance — a butterfly-shaped mass of gray matter surrounded by white matter.

The spinal cord gives off thirty-one pairs of spinal nerves, which traverse various parts of the body. These nerves spring in pairs at the same level from each side of the

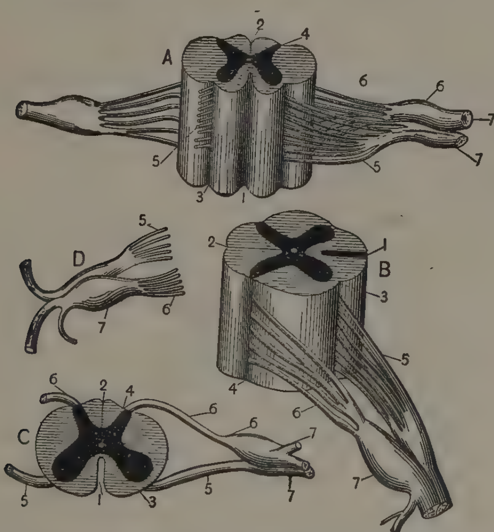

FIG. 5.— Different views of roots of the spinal nerves from regions of the neck. The number 1 in each case indicates the anterior median fissure; 2, the posterior fissure; 3, anterior lateral depression for the anterior roots; 4, posterior lateral groove for the posterior roots; 5 and 6, the anterior and posterior roots, respectively; 7, the united nerve formed by the junction of anterior and posterior roots. — Allen Thompson.

spinal cord. Each nerve has two roots, an anterior and a posterior. At a little distance from the spinal cord these roots unite in one bundle. If the foot were pricked, the sensory impulse would enter the spinal cord by the poste-

rior root. The spinal ganglia would set free a motor impulse, which would leave for the foot by the anterior root of the nerve. If the posterior root of the nerve supplying the foot were cut, the foot might be crushed without a sensation of pain, but a motor impulse could be sent as before. If the anterior, or motor, root were cut, the application of a hot iron would cause as much pain as ever, but the sufferer could not move the foot an inch from the iron, no matter how great the pain.

A large part of the body is absolutely dependent upon the integrity of the spinal cord for the transmission of sensory and motor impulses. If a person's back is broken, that part of the body supplied by nerves attached to the spinal cord below the seat of injury is paralyzed. Such an unfortunate might watch the amputation of his own leg with as little feeling of pain as if the limb belonged to another person. No act of will would suffice to move such a limb.

Reflex Action. — Reflex nervous action is the result of that power resident in nervous ganglia, which often unconsciously causes many muscular and vital movements. The spinal cord is largely made up of such masses of nervous matter, which have sometimes been called "little brains." If one were to prick the toe of a sleeper, the sensory nerve at that point would report the fact to one of the lower spinal nerve masses. This ganglion, without waiting to hear from the brain, would issue a command to the motor nerve, and the foot would be immediately withdrawn. Unless the thrust were severe, the sleeper would not awake, nor would he be conscious of pain or of the movement of his foot. This nervous action is called reflex, because, when the sensory nerve conveys an impulse to the ganglion, this impulse is at once, and without the action of the will, reflected

back by a motor nerve. Thus the mind is not only saved the trouble of attending to every little movement, but much time is gained. After the child has learned the difficult art of balancing himself on his feet, walking becomes largely a reflex act. At first the child must center his whole attention on movements to balance the body. The man can think out the most complex problems while walking, because the reflex nervous centers are superintending the balancing process.

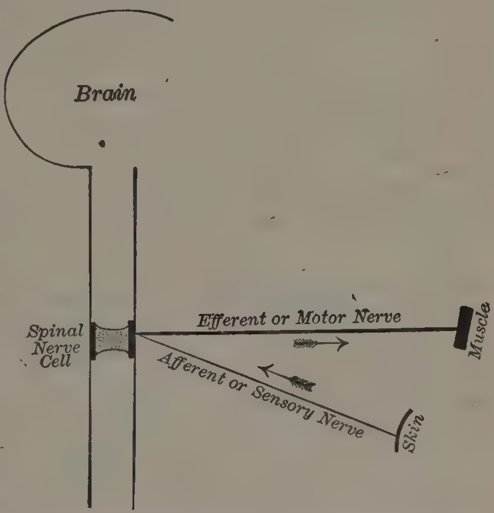

FIG. 6.—Diagrammatic representation of reflex action. A nerve is stimulated in the skin, and the sensory nerve transmits the sensation to the spinal nerve cell, which reflects back the impulse by the motor nerve, causing muscular movement. There may be no knowledge of this in the brain.

Few men remember which end of the collar they button on first, or which shoe they put on first; yet the reflex nerve center, if left to itself, has an invariable order in executing these movements. Some vertebrates have much more reflex power than man. The spinal cord in such animals keeps its vitality for a long time after decapitation, and the nerve masses in the cord have the power to set the motor nerves in action, causing muscular contraction. For this reason a decapitated snake will squirm around in a lively manner if its tail is struck. The

reason why fowls often flutter so violently after the fatal stroke is because they are thrown roughly down. The sensory nerves report the bruise or jar to a reflex center, which agitates the motor nerves controlling the muscles which would ordinarily move them out of harm's way. If beheaded fowls are laid down carefully on straw or some soft substance, they will scarcely move. But if they should be kicked a moment or two later, they will frequently jump around in a lively manner. If acid is placed on the side of a decapitated frog, the animal will, by reflex action, bring its foot to the spot and try to brush the drop away. Man also has something of this reflex power after death. The pectoral muscle of a beheaded French criminal was pinched, and the right hand was raised to the spot as if to remove the cause of the injury.

The Medulla Oblongata. — At its upper end the spinal cord enlarges into the medulla oblongata, which is a reflex center of a higher order than the spinal cord. The medulla has more or less control of the sympathetic nervous system, which regulates the heart, lungs, blood vessels, and various abdominal organs. If the muscular contraction and expansion of the heart were under direct mental supervision, a person might become so interested in something, or so excited by an accident or unusual event, that he would forget, until too late, to move the muscles of the heart. The same might also be true of respiration. The medulla has power to attend to these, without calling on the brain and obtruding the unnecessary details on consciousness.

The Cerebellum. — The cerebellum, or little brain, lying above the medulla, is also a reflex center of a high order. The cerebellum is the organ which coördinates muscular

movements necessary to balance the body while moving through space. It has been found that whenever the cerebellum of animals is injured, their gait is affected. Excessive injury renders walking impossible (1).[1]

The Brain. — Hitherto, in discussing the nervous system, we have been speaking of reflex acts and the nerves of

FIG. 7. — Side view of the brain in the skull. *F* is placed on the frontal lobes, which extend back to *R-R*, the fissure of Rolando, and down to *S-S*, the fissure of Sylvius. *T* is placed on the temporal lobes, which lie below *S-S*. *P* marks the parietal lobes, which are behind the fissure of Rolando and extend downward to *PO*, the parieto-occipital fissure. *O* is on the occipital lobes, which comprise the lower rear part of the brain. The fissures of Rolando and Sylvius are the first landmarks to be learned.

transmission. There is not the slightest mental element about any of these reflex acts. An affection of the retina, of the tympanum of the ear, or of the nerves of taste, is not a mental phenomenon. Before the actions of the

[1] See under "Authorities Quoted," at end of chapter.

sensory nerves can become mental, they must report to headquarters in the brain, in such a manner as to affect consciousness. There is as much mental quality in the picture on the plate in the camera as in the picture on the optic retina. The vibrations of the aural tympanum

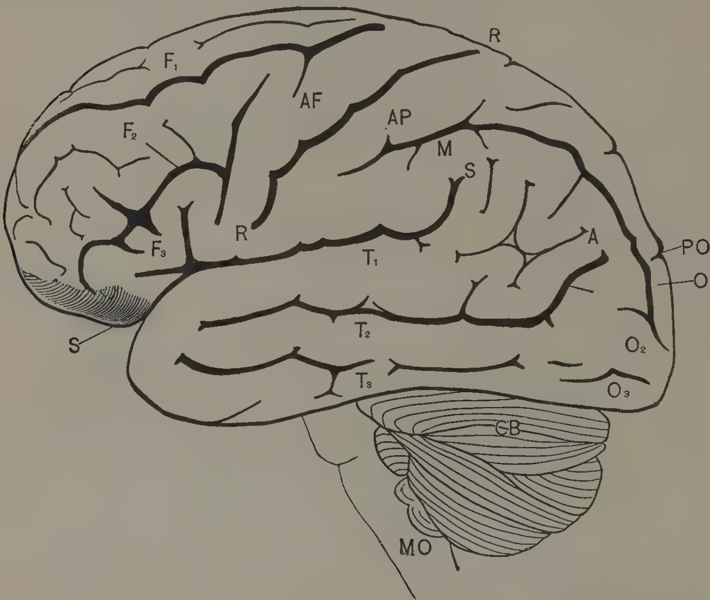

FIG. 8.—Diagrammatic side view of brain, showing cerebellum, *CB*, and medulla oblongata, *MO*. F_1, F_2, F_3, are placed on the first, second, and third frontal convolutions; *AF*, on the ascending frontal; *AP*, on the ascending parietal; *M*, on the marginal; *A*, on the angular. T_1, T_2, T_3, are placed on the first, second, and third temporal convolutions; O_1, O_2, O_3, on the first, second, and third occipital convolutions. *R-R* marks the fissure of Rolando; *S-S*, the fissure of Sylvius; *PO*, the parieto-occipital fissure.

are as purely mechanical as are those of a drum; but the eye and the ear have a brain connected with them, while the camera and the drum have none.

The cerebrum, or large brain, occupies the greater part

of the cavity of the skull. The cerebrum is divided into two hemispheres, the right and the left. For our purpose we may call attention to four lobes on the outer surface of each hemisphere. A deep furrow, called the *fissure of Rolando*, divides the upper portion of each hemisphere transversely into two parts, while the *fissure of Sylvius* does the same thing for the sides of each hemisphere.

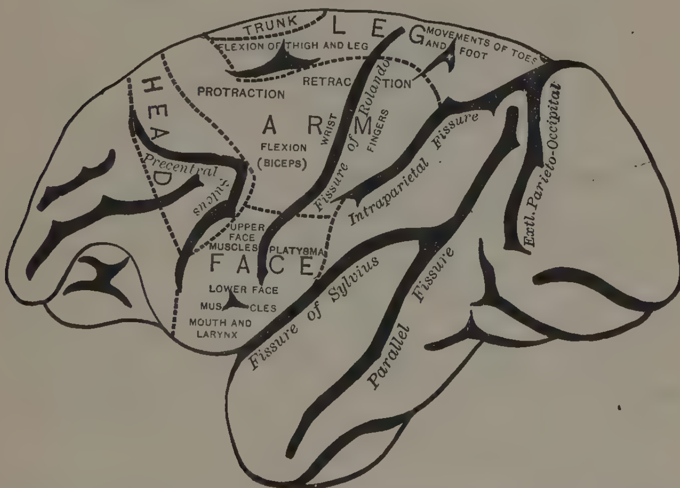

FIG. 9.—Side view of a monkey's brain, showing motor centers.—Horsley and Schafer.

The surface of the brain anterior to these two fissures is called the *frontal lobe*. The *parietal lobe* lies immediately behind the fissure of Rolando and extends down to the *occipital lobe*, which comprises the rear part of the brain. The *temporal lobe* lies on the side of the brain immediately behind and below the fissure of Sylvius. Each of these lobes is divided into convolutions by furrows more or less distinct.

There is a correspondence between the interior surfaces of the two hemispheres where they face each other, just as the halves of an apple match on their plane side. These interior surfaces of the hemispheres have certain convolutions, of which it is not easy to form an idea without a brain model. (See Fig. 12.)

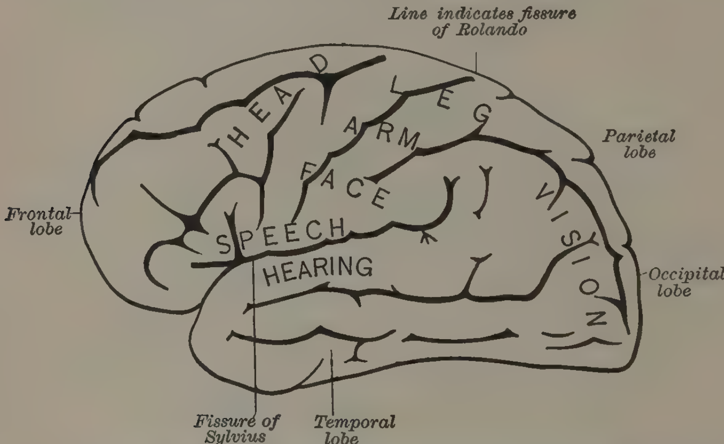

FIG. 10.— Diagram showing position of sensory and motor centers on the outer surface of the human brain. The convolutions on which these centers fall may be seen on referring to Fig. 8.— Kirke's *Handbook*.

Localization of Functions. — It can scarcely be doubted that the brain, like a large city, has much of its complex business systematized and localized. Those anxious about the arrest of a criminal go to see the chief of police; those wishing to search a title go to the county clerk's office; those who try cases repair to the court chambers. In like manner the senses report to certain parts of the brain, while other well-defined parts send out a motor order to raise a hand or to speak a word.

The *motor zone*, or that part of the brain concerned in

sending out orders to move the body, lies on either side of the fissure of Rolando. So definitely has this area been mapped out, that it is possible to find, for the purpose of a surgical operation, so small a center as that which moves the vocal cords, directs a thumb, or winks an eye. When the motor region of the brain is laid bare, and its various parts are stimulated by electricity, the muscles governed by certain areas immediately contract. (See Figs. 9 and 10.)

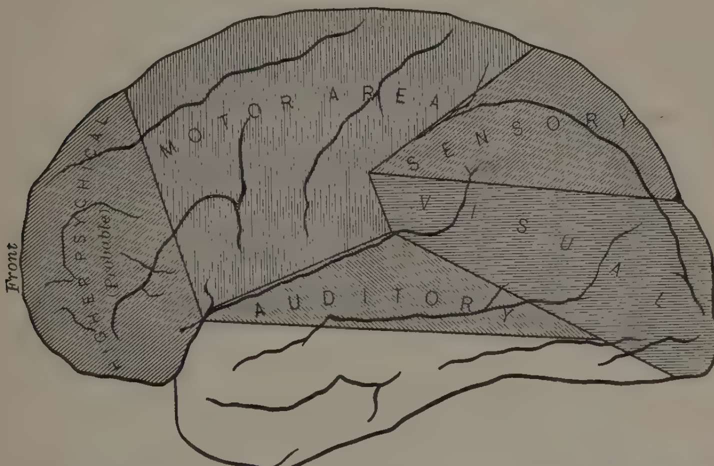

FIG. 11. — Side of left hemisphere of human brain, showing the principal localized areas. — Adapted from Mills.

Sensory brain tracts are those concerned in receiving impressions from the senses. The center for sight is in the occipital part of the brain; that for hearing is probably in the rear two thirds of the first and second temporal convolutions (Fig. 8, T_1, T_2). The center for touch has not been definitely ascertained, but the lobe of the *gyrus fornicatus* (Fig. 12), on the mesial surface of the brain, and the

parietal area (see Fig. 11, portion marked "Sensory") are probably most actively concerned in this sense. The centers for taste and smell are uncertain. What evidence there is, places them under the front part of the temporal region and immediately behind the fissure of Sylvius, in the convolution of the *gyrus hippocampus* (Fig. 12).

The higher functions of the mind, such as imagination and thought, have never been localized. The entire brain is probably an organ of memory. In general terms, we

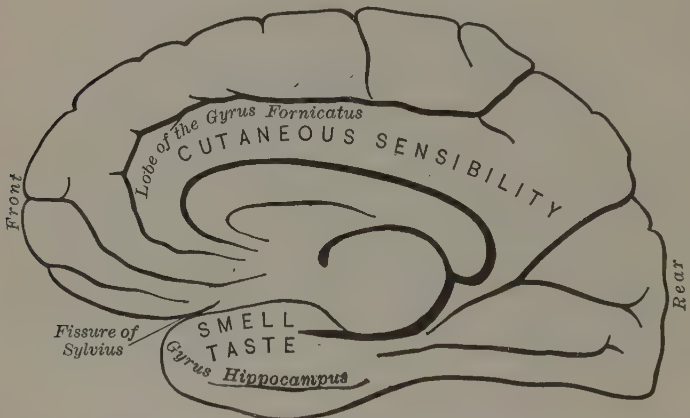

FIG. 12.—Interior surface of a hemisphere of the brain, showing probable localization of touch, taste, and smell.—Modified from Kirke's *Handbook*.

may say that the cortex, or outer surface of gray matter enveloping the brain, is the part most concerned in mental action. There is only a probability that the higher forms of psychical action are most closely connected with the frontal lobes. The interior of the hemispheres of the brain is almost entirely composed of connective nerve fibers.

It is desirable for the average person to have such a gen-

eral knowledge of brain localization as may be obtained from the accompanying diagrams, because the necessity for the unifying action of mind will be thereby better comprehended. When we study the separating and the combining powers of the imagination, we shall then remember that different sensations at the very first ran into different parts of the brain. When we investigate the will, we shall the better understand how a sensation, pouring into one part of the brain, is transformed in another part into a motor stimulus, and thus completes its passage along a nervous arc.

Observed Effects of Mental Action on the Brain. — Thermometers placed against the scalp have shown a rise of temperature during any mental effort, whether it be in noticing some new thing, in committing to memory, in thinking, or in experiencing an emotion. While a woman was being subjected to a test of this sort, from no apparent cause her temperature suddenly rose. The explanation was that she had at that moment caught sight of a skull in the room.

From experiments on animals, we learn that the active use of their senses causes a rise in cerebral temperature. A German investigator found that when he presented something not good to eat to the nostrils of a dog, the momentary sniff was accompanied by a slight rise in temperature. When a package containing a piece of meat was offered, the temperature was higher, because of more lively emotional interest.

A table, balanced as accurately as an apothecary's scales, has been devised, so that a person may recline on it in a horizontal position. If he begins to think, or to use his mind actively, down goes the head end, because of the increased amount of blood in the brain. The knowledge

of the effect of mental action on the brain teaches us that this organ comes under the law, that the harder any organ is worked the more rest and nutriment it must have. To secure the best intellectual action, there must be assimilation of the most nutritive food, sufficient sound sleep, and an adequate amount of pure air and exercise; otherwise the brain will become a dulled tool. Intellectual culture probably causes definite effects upon the structure of the brain and tends to keep it plastic longer. It is doubtful whether the cerebral cortex ever returns to its exact previous condition after receiving a new sensation.

The brain of a fairly intelligent person, if unfolded and smoothed out, would be found to have a superficial area of about four square feet. The greater the intelligence of the person, the deeper are the convolutions and the finer the structure. Education, instead of rendering the brains of the sexes more alike, serves rather to intensify the difference. The faces and the brains of male and female savages resemble each other far more closely than do those of the different sexes among the most intelligent people.

Relation between Age and Brain Growth. — The brain reaches its maximum weight by the fifteenth year, but probably continues developing internally until at least the age of thirty. There comes a time when the brain, like the rest of the body, ceases to grow and remains at a standstill. Between forty and fifty, a slow decrease in the weight of the brain begins, at a rate varying with different people. From this, we see the superiority of youth to age in securing mental culture. A young brain is vigorous, like a young body, and can travel much faster over the continents of perception and memory.

The brain is less plastic after twenty, and it gradually,

so to speak, ossifies. Few men, after passing far into the thirties, get an *entirely* new idea into their heads, although the brain of the genius, as well as a brain judiciously exercised, probably remains plastic beyond the usual period. After even the age of forty, a fine structure of thought may be erected with materials already gathered upon foundations already built, but any new fact will be apperceived (see p. 85) in terms of former knowledge. A study of brain structure impresses the necessity of early doing all we can. Investigations tend to show that the cerebral association fibers, which probably furnish the physical basis for thinking, cease progressive medullary development before forty. Some authorities think that the capacity for gaining new ideas ends earlier than indicated above. Professor James says, "Outside of their own business, the ideas gained by men before they are twenty-five are practically the only ideas they shall have in their lives; they cannot get anything new. Disinterested curiosity is past, the mental grooves and channels set, the power of assimilation gone" (2).

Peripheral Nervous System.

The Senses. — If currents from the various sensory nerves did not flow into the brain, we should get no knowledge of the outside world; the cerebral mechanism, which is the most wonderful known to us, would be useless. The brain gets dispatches from the optic, auditory, olfactory, tactile, gustatory, and other nerves. These dispatches are the data from which we get our knowledge of the world.

The Sense of Touch. — Myriad sensory nerves have their endings in the skin. When these are sufficiently excited,

they transmit to the brain a peculiar sensation of pressure, which we refer to the surface of our bodies. In this way our world of touch is built up, and we know things as hard, soft, smooth, sticky, rough, and as offering resistance. The precise way in which we construct this tactile world will be considered under Perception. (See Figs. 13 and 14.)

FIG. 13. — Diagrammatic view of the under surface of the index finger, showing nerves and Pacinian touch corpuscles. *a*, *a*, nerve; *b*, *c*, lateral and terminal branches of the nerves; *d*, *d*, *d*, Pacinian corpuscles.— M'Kendrick, after Schwalbe.

There is great difference in the tactile sensitiveness of the skin. The distance at which the points of a pair of blunted compasses can be distinguished apart varies from one twenty-fourth of an inch at the tip of the tongue to one inch on the cheek, and two and a half inches in the mid-dorsal region.

FIG. 14. — Touch corpuscle magnified 50 diameters. — M'Kendrick.

When a touch corpuscle is excited, the sensation persists for a time after the removal of the exciting object. If the finger is held against a revolving wheel with blunt teeth, they are felt separate so long as the revolutions are not too rapid; but if quickened sufficiently, the surface of the toothed wheel will seem smooth. In touching different objects in quick succession, the nerves may not have lost the excitation from one object when another is touched. Hence our tactile knowledge of the second object would

be a mixture of the qualities of both objects. This persistence is easily understood in the case of taste, when the second object's qualities may appear changed because something else has been eaten immediately before. We then say that the taste of the other is not yet out of the mouth. We can also say that the touch of a former object is not yet out of the skin, the sight out of the optic nerve, the sound out of the auditory nerve, the smell out of the olfactory nerve; although sensations from the other senses seldom persist as long as those of taste.

What is popularly known as touch is really due to diverse sensations. Among these must be reckoned those of pressure and temperature, as well as muscular sensations. Specialists tell us that "a lesion which may cut off the possibility of feeling pain in a given part of the body, may leave it still susceptible to sensations of heat and cold; or the sensation of touch may be present while the sensation of pain cannot be aroused. From this we see that nerve impulses, giving rise to sensations of touch, of pain, of temperature, of the muscular sense, must pass upwards to the sensorium by different paths, one of which may be cut off while the others remain" (3).

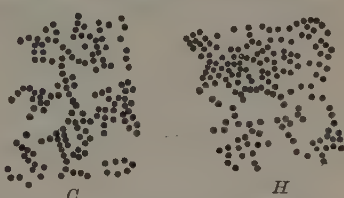

FIG. 15. — *C*, cold spots; *H*, heat spots, found on the back of the wrist. — Goldschneider.

Temperature Sensations. — If we take a metal pencil and dip it in hot water, we shall find as we pass the point over our skin that certain spots are sensitive to heat. If we move the point, we shall find spots sensitive to cold alone. Here the metal does not feel warm. (See Fig. 15.) If we put cold metal on a "heat spot," the sensation of cold is absent. These

points do not coincide with those specially sensitive to touch. A washerwoman will hold her iron near her cheek to test the temperature. The cheek is especially responsive to thermal sensations, not so to tactile ones. It is probable that there are special thermal nerves.

The temperature sense furnishes us with a good illustration to show that our senses do not make an absolute, but only a relative, report concerning the world. We can easily demonstrate that the same water may seem both hot and cold to us at the same time. Let *A* be a bowl of cold water; *B*, a bowl of hot water; *C*, a bowl of lukewarm water. Plunge the right hand into *A*, the left into *B*; then withdraw both and plunge them into *C*. The lukewarm water will seem warm to the right hand, cold to the left.

The Muscular Sense. — There are sensory nerves originating in the muscles, as well as in the skin. When we take hold of anything heavy, these sensory nerves in the muscles yield a different sensation from that produced by lifting a light object. The term "muscular" has been applied to those sensations coming from the muscles when in motion or at rest, when tense or relaxed. Muscular sensation is always more or less voluminous, and it is characterized by a spatial element which helps us to form our idea of bodies in space. (See p. 71.)

The Sense of Sight. — "The optical apparatus may be supposed for the sake of description to consist of several parts. First, of a system of transparent refracting surfaces and media by means of which images of external objects are brought to a focus upon the back of the eye; and secondly, of a sensitive screen, the retina, which is a

specialized termination of the optic nerve, capable of being stimulated by luminous objects, and of sending through the optic nerve such an impression as to produce in the brain visual sensations. To these main parts may be added, thirdly, an apparatus for focusing objects at different distances from the eye, called *accommodation.* Even this does not complete the description of the whole organ of vision, since both eyes are usually employed in vision;

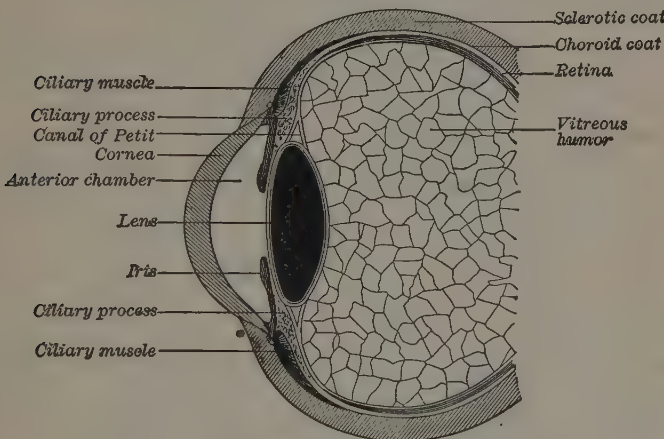

FIG. 16. — Section of the eyeball. — Kirke's *Handbook.*

and fourthly, an arrangement exists by means of which the eyes may be turned in the same direction by a system of muscles, so that binocular vision is possible.

"The eye may be compared to a photographic camera, and the transparent media correspond to the photographic lens. In such a camera images of objects are thrown upon a ground-glass screen at the back of a box, the interior of which is painted black. In the eye, the camera proper is represented by the eyeball with its choroidal pigment, the

screen by the retina, and the lens by the refracting media. In the case of the camera, the screen is enabled to receive clear images of objects at different distances, by an apparatus for focusing. The corresponding contrivance in the eye is the accommodation. The iris, which is capable of allowing more or less light to pass into the eye, corresponds with the different-sized diaphragms used in photographic apparatus" (4). (See Fig. 16.)

The important facts for the student of psychology to remember about the physical mechanism of the eyes are: (1) that they resemble photographic apparatus, although far more complex; (2) that the fibers of the optic nerves leading from the retina of each eye meet at the base of the brain, where part of these fibers decussate, or cross to the opposite side (see Fig. 17); (3) that these fibers lead to brain cells in the occipital lobes; (4) that only the resultant retinal change due to light reflected from objects is transmitted to the occipital lobes by the optic nerves; and (5) that these sensations from light thus aroused in the occipital lobes are interpreted by a perceiving mind to mean certain things, in the same way that Chinese symbols are translated into thoughts.

Since muscular sensations are such important factors in estimating the distance and spatial relations of bodies, it is important for the student to know that the eye has six muscles, four of which are straight, and attached to the front part of the eyeball. There are two oblique muscles which are joined to the sides of the orbit behind the attachment of the straight muscles. These oblique muscles, as their name implies, tend to pull the eyes obliquely between the directions given by the other muscles. In this way the eyeball can be rolled upward, downward, inward, outward, and in oblique directions. If we look at a near object,

there is considerable muscular strain to converge the eyes to bear upon it. When we look at a remote object, this

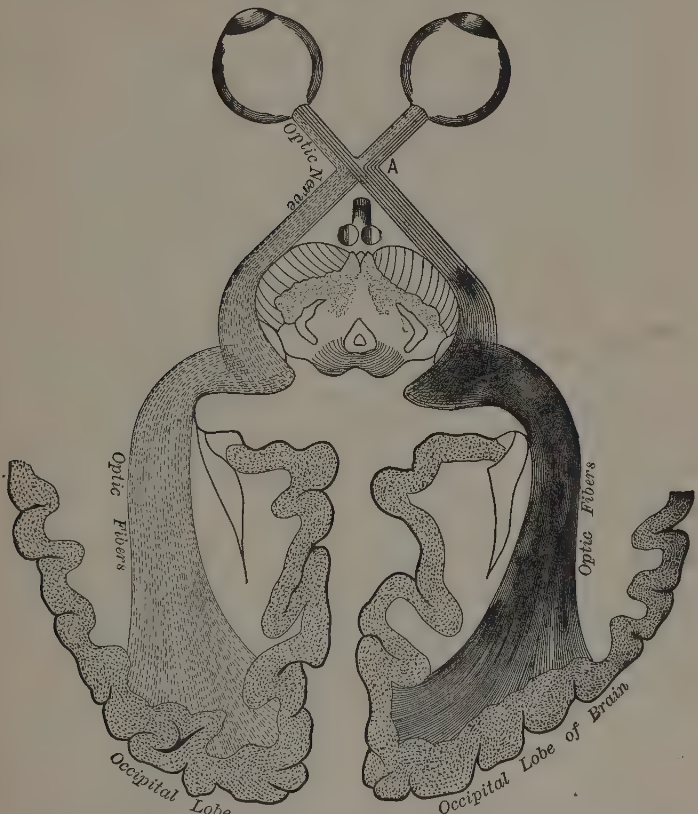

FIG. 17.—Semi-diagrammatic representation of the nervous processes concerned in vision. *A*, optic chiasma, or place where a portion of the optic fibers from each eye cross to the opposite side. The course of the optic fibers is shown from the time they leave the eye until they pass into the occipital lobes of the brain.

strain disappears. Hence the muscular sensations vary with the distance and direction of objects.

There is contact in optical, as well as in tactile and olfactory sensations. Vibrations in the luminiferous ether strike the eye and affect the retina. The optic nerve transmits the excitation to the brain, and we see.

From studying the sense of sight, one is impressed with the unity of the mind. In normal eyes there are always two images of the same object, and an optic nerve from each eye leads to the brain. Since a large number of the fibers in the optic nerve from the right eye cross over to the left side of the brain, and a large number of those from the left eye cross to the right side, the problem of sight becomes more complex; for there are not only two images, but each image is partially transmitted to the side of the brain opposite to the direction in which the light from the object enters the eye. In addition to this, the image is always formed on the retina bottom side up. Strictly speaking, the images are never transmitted to the brain, but only the resultant effect. The mind uses this as a datum to construct its picture of the thing seen. When the captain of a steamship sees three red lanterns in a certain position on another vessel, he is not concerned with images of the lanterns, but with what those lanterns mean; namely, that the vessel is disabled.

Some persons whose abnormal eyes do not transmit a fused impression, always see a thing double, and when they dream of a friend, he is double. This fact well shows the dependence of our mental images on our senses. If we hold a pencil between us and the sky and focus our eyes on a distant cloud, we shall see two hazy images of the pencil. When such occasional instances occur in ordinary life, we simply pay no attention to the second image, just as we do not heed the striking of a clock when we are seriously engaged.

If an object vanishes after having been seen for a second, the effect always lasts on the retina for an appreciable length of time. If a firebrand is rapidly revolved, it appears to be a complete circle of fire. When the sensation is very strong, as in the case of an electric light, the after effect may last for several minutes. If we look at differently colored objects close together, a certain amount of retinal impression from each lasts to color the sensation from the next object. This furnishes a physical analogy to the mental process of apperception, where the mental perception of a new object is influenced by what we have before experienced, so that the product is a resultant of both perceptions.

The only direct and unaided office of the eye is to tell different shades of color and intensities of light. We shall see that everything else that it seems to tell us is a product of inference. But the eye is sometimes wrong in reporting simple sensations. "Suppose, *e.g.*, that you cut little squares from the same gray paper, and lay them upon red, green, yellow, and blue papers, placed side by side. They all look different: that on the red is greenish; that on the green, reddish; that on the yellow, bluish; that on the blue, yellowish" (5). Herschel says that the eyes of the workers on mosaics at the Vatican distinguished correctly between 30,000 different shades of color.

The Sense of Hearing. — The ear and the auditory nerve are the organs which transmit to the brain the effect of atmospheric vibrations. The ear is a labyrinthine cavity so constructed as best to convey these sound waves to the auditory nerve. The psychologist is not specially concerned with these intricate windings or with the mechanical principles involved. It is important for him to know

that the sound waves affect the inner ear, set the auditory nerve in action, and that this action is transmitted to the brain. (See Fig. 18.)

Individual ears differ much in their capacity for receiving atmospheric vibrations. The rates of vibration between which sounds are most commonly heard are from 30 to 30,000 in a second. A lower rate of vibration than

FIG. 18.—Section of the ear (Czermak). *M*, outer ear; *G*, external auditory canal; *T*, membrane of the tympanum; *R*, opening of the Eustachian tube into the pharynx; *P*, cavity of the tympanum; *Pt*, scala tympani; *Vt*, scala vestibuli; *V*, vestibule; *B*, semicircular canal; *S*, cochlea; *A*, auditory nerve.

16 in a second does not affect the auditory nerve sufficiently to cause hearing. Beyond 36,000, the rapidity is so great that no sound is heard.

Our ears give different sensations according as sounds vary in certain characteristics. (1) The *pitch*, or the number of the vibrations, differs. Thus, the creaking of a rusty hinge is unlike the resonance of a bass drum. The pitch

of the human voice in singing is usually between 87 and 768 vibrations a second, although Nilsson's voice is said to have reached 1365. We see that the range of the ear is far beyond these. (2) Sounds vary in *intensity*, or in the amplitude, of the vibrations. The noise made by a mosquito differs from the roar of a cannon. (3) The *quality* differs according to the agent producing the sound. A flute, a trombone, a cornet, and a harp may all be playing the same tune, but the quality of sound emitted by each instrument varies. (4) The *relation* of one sound to another varies, so that either harmony or discord, music or a noise, is the result.

Aural sensations persist for some time after the cessation of the atmospheric vibrations. Thus, we can hear the ringing of a bell after it has stopped. It is also sometimes impossible to distinguish between a present and a remembered sound. We will often find it hard to decide whether the ringing of the bell, which we seem to hear some time after its cessation, is due to the persistence of the sensation in the ear or to the activity of a cerebral memory cell. It is well to note this fact, for it helps us the better to understand the primary causes of illusion.

The Sense of Smell. — The cavity of the nostrils is lined with a mucous membrane filled with nerves of general sensibility as well as of smell. In order to stimulate the olfactory nerves and arouse a sensation of smell, air containing odorous, gaseous particles must come in contact with the nerves of the mucous membrane. The qualities of smell are so many and so indefinitely separated that it is useless to attempt a classification. Sensations in our noses are often compounds of smell, touch, and taste.

The intensity of an odor depends on the number of gaseous molecules which the substance emits and the

intensity of affection of the olfactory nerves. Musk is very odorous, as it gives off many molecules, thus affecting a large nervous surface in the nose. Ammonia gives off fewer molecules, but they affect the nerves more violently.

The Sense of Taste. — In the tongue there are myriad little cellular bodies called *taste buds*. When a soluble substance, like quinine or sugar, is placed on the tongue, these taste buds are affected, probably in a chemical way. This affection stimulates the connecting gustatory nerves, which transmit the excitement to the brain, thus causing the sensation of taste. We can easily recognize four taste sensations, — bitter, sweet, sour, and salt. The almost numberless sensations shading off from these are products of both smell and touch. "The pleasantness of many sorts of food (*e.g.* jelly) is certainly derived chiefly from their effect upon the delicate skin of the palate, and is, therefore, much more a question of touch than of taste. In the wider sense in which it is customary to speak of taste, the Shah of Persia was right when he reproached Europeans (who used knives and forks) for not knowing that the sense of taste begins in the finger tips" (6).

Speed of Nerve Transmission.

Transmission of Nervous Stimuli Requires Time. — We have seen that the tactile, optic, auditory, olfactory, and gustatory nerves pour currents into the brain, which result in sensation. Both nervous and mental processes take time. Nerve currents have been likened to electricity, but the rate of nervous transmission is far slower.

A sensory nerve conducts a message at the average rate of 111 feet a second. If a man had an arm 111 feet long,

one second would elapse from the time his finger was pricked before he felt pain. Some of the older metaphysicians used to teach that the soul came into actual contact with matter at the finger tips. A study of our nervous mechanism has completely shattered this assumption. If a man had an arm sufficiently long to plunge into the sun's vaporous metal, 140 years would roll by before he felt any pain. In other words, he would die before the soul knew that the hand was burned. A motor nerve also transmits a command from the brain to the muscle at the rate of 111 feet a second. Suppose an orange tree ninety-three millions of miles in height; and the hand on an arm of that length already lying on a bough one foot from a desired orange. The mind issues a command to grasp the fruit. This order would reach the hand in 140 years, and not until then would the hand grasp the fruit.

Reaction Time. — The time necessary for the simplest form of reaction is determined in this way: A person's finger is touched, and it is arranged that as soon as he feels the touch he shall move his foot. In this process we may call attention to four different elements. (1) There is the time occupied by the sensory nerve in transmitting the sensation from the finger to the brain. (2) There is the time taken by the brain or mind in perceiving this sensation after it is registered on the cortex. (3) There is the period occupied in issuing a motor fiat, or in willing to move the foot. (4) There is the time consumed by the motor nerve in carrying this command to move the foot. Since we know that the time occupied by the sensory and the motor nerves in transmitting impulses is about 111 feet per second, we can compute the period taken in the brain to perceive the sensation and to will a movement. (1) and

(4) are purely physiological times. The periods of perception and of willing, (2) and (3), are known as the mental time, which in such a case as this is about one fifteenth of a second. The time consumed in all four of these processes is generally greater than one tenth and less than one fifth of a second; but these times are only approximate, since they vary with the individual, with the time of year and time of life, with bodily condition, with the kind and intensity of the stimulus, with the direction of the attention, and with the amount of expectation involved.

The times given above are those taken by a subject who knows beforehand exactly what signal is to be given him and the responsive movement which he is to make. If he was told that when his right finger was touched, he was to move the left foot, but when the signal was given to his left finger, his right foot was to be moved, the mental time would be nearly double that given above. There would here be a new element of discrimination, and that would consume the additional time.

The time employed in associating one idea with another naturally depends on many factors. Sir Francis Galton found that the average time between the sight of a word, and the appearance in consciousness of a new idea associated with that word, was about five sixths of a second. But the important fact to remember is that all nervous and mental processes take an appreciable amount of time.

AUTHORITIES QUOTED.

1. See Foster's *Text Book of Physiology*, p. 813.
2. James's *Principles of Psychology*, Vol. II., p. 402.
3. M'Kendrick and Snodgrass's *Physiology of the Senses*, p. 14.
4. Kirke's *Handbook of Physiology*, pp. 727–8.
5. Wundt's *Lectures on Human and Animal Psychology*, p. 113.
6. Höffding's *Outlines of Psychology*, p. 102.

CHAPTER II.

CONSCIOUSNESS AND ATTENTION.

Nature of Mind and Matter. — It used to be the fashion to begin psychologies with a discussion concerning the material or immaterial nature of the mind. It has been well said that psychology is no more bound to begin by telling what mind is, than physics is obliged to start by settling the vexed question as to what matter is. Psychology studies the phenomena of mind, just as physics investigates those of matter.

Fortunately, phenomena do not change with our varying views as to what things really are. The phenomena of electricity remain the same whether we consider it a fluid, a repulsion of molecules, or vibrations of the ether. If a man held the strange theory that electricity was a flock of invisible molecular goats that pranced along a wire with inconceivable rapidity, he would still have to insulate the wires in the same way, generate the current in the same way. A strong discharge would kill him as quickly as if he held a different theory. In short, his views of the ultimate substance of electricity would in nowise change its phenomena.

If any materialist should hold that the mind was nothing but the brain, and that the brain was a vast aggregation of molecular sheep herding together in various ways, his hypothesis would not change the fact that sensation must precede perception, memory, and thought; nor would the laws of the association of ideas be changed, nor would

the fact that interest and repetition aid memory cease to hold good. The man who thought his mind was a collection of little cells would dream, imagine, think, and feel; so also would he who believed his mind to be immaterial. It is very fortunate that the same mental phenomena occur, no matter what theory is adopted. Those who like to study the puzzles as to what mind and matter really are, must go to metaphysics. Should we ever find that salt, arsenic, and all things else, are the same substance with a different molecular arrangement, we should still not use them interchangeably.

Consciousness.

Definition. — Consciousness is that indefinable characteristic of mental states which causes us to be aware of them. The full growth of ideas, the development of associations between them, and the processes involved in emotion, are not always limited to the sphere of consciousness. Full-fledged ideas frequently start into consciousness. We sometimes dream or suddenly think of a solution, which is the result of unconscious brain activity working toward a given end. Sometimes a genius writes a work, the full splendor of which he is not aware of until after its completion. There were in him forces, partly unconscious, tending toward the wonderful result.

When we become unconscious from a blow on the head, or from sleep, we no longer know any mental occurrences. By contrasting these two states, we shall have a better idea of consciousness. The atoms in a granite rock may be in a state of constant vibration, but we can hardly imagine the rock to be aware of the fact. The light of a beautiful sunset may be reflected upon the rock; but there is no consciousness in the rock of the splendor.

Strictly speaking, consciousness is incapable of definition. To define anything, we are obliged to express that thing in terms of something else. When we say that sugar is a sweet substance, and are asked what a sweet substance is, we reply that honey, maple syrup, sorghum, will give a fair idea of such a substance. Now, there is nothing else in the world like consciousness, hence we can define it only in terms of itself, and that is very much like trying to lift one's self by one's boot straps. If a person had never eaten sugar, we could give him an idea of it if he was familiar with honey and other sweet things; but if he did not have a rudimentary idea of what consciousness is, from its possession, ages of explanation would fail to make him understand. The blind man thought that scarlet must resemble the sound of a trumpet. That was the best idea of the color that he could form.

Consciousness is one of the greatest mysteries that confronts us. Huxley rightly says: "How it is that anything so remarkable as a state of consciousness comes about by the result of irritating nervous tissue, is just as unaccountable as the appearance of the jinnee when Aladdin rubbed his lamp."

It is usual to discriminate between *consciousness* and *self-consciousness*. The difference between the two states may be seen in such examples as these: When I see a child run over and killed, I am conscious of the event, but do not think of myself. The stream of conscious attention is here directed *outward*. When I find myself thinking of New Zealand and wonder how that came to mind, when I direct the mental gaze *inward* to find a connection between that idea and the preceding one, I am self-conscious. When I think of my own hopes and fears, of the difference between myself and another person, and wonder how the content of

his consciousness resembles mine, I am self-conscious. Self-consciousness is a growth. Many persons never have more than a misty idea of such a mental attitude. They always take themselves for granted, and never turn the gaze inward.

Distinction between Subjective and Objective. — The mind's attitude is called *subjective* when the mental gaze is turned within itself to notice what is taking place. The mental state is termed *objective* when the mind is looking at things in the outside world. A good novelist is first busied with objective study. He searches for characters and plots, or suggestions for them, in the outside world. When, by this means, he has formed definite ideas in sufficient quantity, he writes his novel. During the period of composition, he is busy marshaling these subjective mental objects. When Bunyan wrote his *Pilgrim's Progress*, subjective pictures thronged before him. He had found the necessary objective material for them in the Puritan army and its opponents, and in the Bible.

The student of psychology must learn to have a clear idea of mental objects. This may occasion him some trouble at the start, for they are unlike anything else. He has been used to those objects which he could touch, taste, hear, see, or smell; but mental objects can be known by none of the senses. The bodily eye does not tell us that we are calling up the face of an absent friend. The image of the face is just as distinct with our eyes shut. There is neither touch nor sound when mental objects are linked together in thought.

Necessity of the Study of Consciousness. — No one would ever find out from the study of physiology alone that con-

sciousness existed. He might dissect a Socrates, he might trepan a living Newton, but the dissector would never reach the thought. He might see the gray matter in unusual activity, but not the emotions of love or fear, the memories of childhood, the thoughts which advanced the world. The man who stops with the study of physiology, will never touch the hem of the robes of imagination, thought, emotion, or will. On the other hand consciousness would never reveal to man the fact that he had a brain.

Nevertheless, it is true that the old psychology, which derived its knowledge from the study of consciousness alone, was one-sided; for it did not sufficiently take into account the fact that mental operations are conditioned by nervous matter. But the old psychology was not so one-sided as the material school, which would leave consciousness entirely out of account.

In the study of psychology, we are therefore obliged to make use of *introspection*, which is only another term for consciousness forcibly directed toward mental operations. By introspection, we watch the stream of ideas flowing through the mind, and notice how they are connected, what new combinations they are capable of forming, and what laws they obey.

Mental Objects Precede all Material Invention. — Those who exclusively study flowers, rocks, metals, or animals, may think that psychology deals only with "such stuff as dreams are made of," that all its objects are airy phantoms of little worth. Such students may say that they can see some use in an objective bridge, none whatever in a subjective one. But they must remember that the Brooklyn Bridge first existed in the mind before the structure became an objective reality. The projectors had first to

plan what they intended to do. Then they had to put these plans on paper in the form of drawings, the mind going before the pencil, and telling the fingers where to put the next line. Only after the mental object was complete, was matter slowly poured into this mental mold. Only then did that wonderful bridge, connecting two great cities, become a reality. The same is true of every step in material progress, from the invention of the sewing machine to that of the telephone. In the battle of life, those succeed best who can form definite ideas of what they are going to do, before they start to do it. Others are prone to get into trouble, and are often forced to retrace their steps.

The Subconscious Field.—It must not be supposed that the mind is at any one time conscious of all its materials and powers. At any moment we are not conscious of a thousandth part of what we know. It is well that such is the case; for when we are studying an object under a microscope, trying to memorize poetry, demonstrating a geometrical proposition, or learning a Latin verb, we should not want all we knew of history and physics, or images of the persons, trees, dogs, birds, or horses, that we remembered, to rush into our minds at the same time. If they did so, our mental confusion would be indescribable. Between the perception and the recall, the treasures of memory are, metaphorically speaking, away from the eye of consciousness. How these facts are preserved, before they are reproduced by the call of memory, consciousness can never tell us. An event may not be thought of for fifty years, and then it may suddenly appear in consciousness.

As we grow older, the subconscious field increases.

When we first began to walk, we were conscious of every step. Later, we can talk about the deepest subjects while we are walking, and not even think of the steps we are taking. We sometimes wind our watches without being conscious of the operation, as is shown by the fact that we again test them to see if we have wound them.

Difference in States of Consciousness. — At various times, states of consciousness differ in several respects: (1) The *intensity* differs. At one time, we are a trifle angry; at another, we quiver with rage. Now we are studying with a sort of diffused consciousness; now, with intense effort. (2) The *extent* of the conscious field differs. Now consciousness embraces only one thing at a time; shortly after, several things. (3) The *speed* of objects varies in crossing the conscious field. At one time, ideas come to us slowly; at another, they jostle each other in a mad rush. (4) Most important of all, states of consciousness differ in *quality*. We are conscious of a difference between a state of thought and of emotion.

Classification of Different Mental States. — No one can successfully dispute the fact that consciousness reveals to us a difference in our mental states. Using this difference as a basis, we may proceed to classify them, remembering that, though all mental powers may be more or less prominent in all states, we are to name the state from the dominant element. If the units of energy at the mind's disposal are represented as one hundred, divided in varying degree between intellectual, emotional, and voluntary action, and if at one time, in a fit of rage, there are ninety units expended in emotional action, five each in intellectual and voluntary action, then this should be called an

emotional state. When Newton was trying to demonstrate the analogy between the earth's action on a falling apple and on the moon, his mental state was chiefly intellectual, although he at the same time felt emotional interest in his work, and also voluntarily pursued it.

When we notice our friends, it is beyond dispute that we see them glad at one time, sorrowful at another; now in determined action, and again sitting down quietly to think out some problem. We realize that the person who to-day is in a rage is the same one who yesterday was laughing. The human mind is a many-sided whole, capable of acting in various ways. Now it is occupied chiefly with intellectual action, now with feeling, and now with determination. It was once the fashion to regard the mind as a structure with three different major compartments. In one compartment, intellectual action was carried on; in another, emotional; in a third, volitional. It was thought that the occupants of one compartment rested while those of another were busy. We now know that the mind is a unit acting as one individual. Just as it is the same small boy, now running, now walking, now climbing a fence, now playing baseball; so it is the same mental energy, now busied in intellectual action, now in emotional, and now in volitional.

Intellect, Emotion, Will. — Recollecting the character of the mind, we may make a three-fold classification of its major functions into *intellect*, *feeling* or *emotion*, and *will*. We have at one time felt that the greater part of our mental energies was expended in looking at things, in remembering them, or in thinking about them; at another, we were not conscious of being much else but happy or wretched; at still another, we were determining and carrying that determination into effect.

Intellectual action is mental energy expended in perceiving, remembering, imagining, and thinking. In emotional action, the mind is mainly occupied with feeling pleasure or pain. In willing, the mind is busied with acting or refraining from action.

Perception, Representation, Thought. — We have seen that intellectual action is one of the three sides of mental action. Now, intellectual action itself has three different sides, according as we are busy *perceiving*, *remembering* or *imagining*, or *thinking*. In actual life these all go together like an apple and its color. But for convenience of study, we may keep in our minds the image of a right-angled triangle. (See Fig. 19.) On the base line we may put emotion; on the perpendicular, will; and on the hypotenuse, joining the two, intellect. On this hypotenuse we may put toward the base, perception; next, representation; and, highest of the three, thought. This will give us a fair idea of necessary mental classi fication.

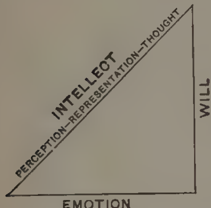

FIG. 19. — Diagram showing classification of mental activities.

All the Mental Powers are Factors in a Complete Mental Act. — We are constantly busied with things which bring into play all the powers of the mind. A boy looks into a garden and sees a tree laden with fruit. This mental activity is chiefly *perception.* The tree is at some little distance, and he is puzzled to decide whether the branches are laden with apples or quinces. He calls up by the *representative power* mental images of former quinces that he has seen. Next, he proceeds to compare the fruit

before him with this image, and he decides that both the color and the shape differ somewhat from those of the quince. In this activity he is *thinking*. He is pleased with the juicy-looking fruit. Memories come to him of the pleasure experienced in eating other apples, and with those memories comes *emotion*. But still he stands there. The mental state is incomplete. The more he looks at the apples, the more he wants them, the stronger becomes his emotion. But he soon finds out that to want and to feel do not bring the apples to him. A high fence is between him and them. Finally his *will* causes him to act. He climbs the fence, plucks the fruit, and begins to eat. This boy has now brought every mental power into play. He has perceived, remembered, thought, felt, acted; and he is now, in consequence, eating the fruit.

Attention.

What is Attention? — Attention is not a new faculty any more than a boy, who rose from his seat and began to run hard, is a different individual from what he was when sitting. Attention is the focusing of consciousness; or, as some express it, attention is detention in consciousness. The sun may scatter its rays over a large surface; or we may focus them in a sun glass, so as to burn a hole through a plank or to boil water. The mind may spread its consciousness dimly over many things; or it may narrow the field of attention and make vast progress in some one line. It is true that if things are easy and familiar, we may attend to several different things at a time; but if new and difficult, in order to advance most rapidly, the attention must be centered upon one thing.

As regards direction, there are two kinds of attention; the one directed within upon *mental* objects, the other directed outward upon *external* objects.

From the point of view of the effort involved, there are also two phases of attention: (1) *reflex*, and (2) *voluntary* attention. Reflex attention is drawn from us by a nervous response to some stimulus. Voluntary attention is given by us to some object of our own selection and is accompanied by a peculiar sense of effort. Many persons scarcely get beyond the reflex stage. Any chance stimulus will take their attention away from their studies or their business.

Factors in Attention. — There are two main factors in attention: (1) the *condition* of the brain and nervous system, and (2) the *quantity and quality* of the stimulus which the object furnishes. The attention which a sickly or a poorly nourished person can give is not at all comparable to that which could come from the same person if vigorous. An inferior or an unhealthy brain has comparatively little power of attention. If a person lives on a skimmed milk diet, he will think skimmed milk thoughts. That nation proverbially known as beefeaters has furnished to the world the greatest literature of all time.

The quantity and the quality of the stimulus have an important effect upon the attention. A terrific peal of thunder or a blinding flash of lightning will take our attention away from almost any object. A change in the stimulus will frequently arrest the attention. A clergyman, talking in loud tones, was astonished to see some of his congregation asleep. He uttered a sentence in a sepulchral whisper, and several of them awoke at once.

The Most Important Laws of Attention. — (1) Attention will not attach itself firmly to uninteresting things.

(2) It will soon decline in vigor, (*a*) if the stimulus is unvarying, or (*b*) if some new attribute is not discovered in the object. (3) Attention cannot remain constant in the same direction for a long period. (*a*) The nervous apparatus of the senses soon tire under the strain of continuous attention toward any one object, and consequently respond with less vigor. (*b*) The same is true of brain cells. To prove the truth of this, one has only to focus the eye continuously on one object or to keep the attention fixed on the same phase of a subject. (4) When one kind of attention is exhausted, we may rest ourselves in two ways: (*a*) by giving ourselves up to the play of reflex attention; (*b*) by directing our voluntary attention into a new channel. The amount of fatigue must determine which is the better. (5) Attention continuously centered upon the same unvarying sensation, or upon any unchanging object, has been proved by experiment to tend to induce either the hypnotic state or a comatose condition.

Attention Develops Interest. — When it is said that attention will not take a firm hold on an uninteresting thing, we must not forget that any one not shallow and fickle can soon discover something interesting in most objects. Here cultivated minds show their especial superiority, for the attention which they are able to give generally ends in finding a pearl in the most uninteresting looking oyster. When an object necessarily loses interest from one point of view, such minds discover in it new attributes. The essence of genius is to present an old thing in new ways, whether it be some force in nature or some aspect of humanity.

Importance of Attention. — There is a constant struggle on the part of sensations to survive in consciousness.

That sensation which we allow to take the most forcible hold on the attention usually wins the day. If we sit by an open window in the country on a summer day, we may have many stimuli knocking at the gate of attention: the ticking of a clock, the sound of the wind, the cackling of fowl, the quacking of ducks, the barking of dogs, the lowing of cows, the cries of children at play, the rustling of leaves, the songs of birds, the rumbling of wagons, etc. If attention is centered upon any one of these, that one for the time being acquires the importance of a king upon the throne of our mental world. But none of these may sway our thoughts, for our attention may be forcibly directed to some other object, which colors our conscious mental life. Hence it is of the utmost importance for our mental welfare to guard the gates of attention. Some persons have the power of voluntary attention developed in such a slight degree, that it has been well said that they belong less to themselves than to any object that happens to strike their attention.

Business men say that the ability to gain the attention is often the secret of success in life. Enormous salaries are paid to persons who can write advertisements certain to catch the eye. A publisher said that he had sold only five thousand copies of an excellent work, merely because it had failed to catch the attention of many, and that twenty-five thousand copies could have been disposed of in the same time, if agents had forced them upon the notice of people. Druggists say that any kind of patent medicine can be sold, if it is so advertised as to strike the attention in a forcible manner. Business life has largely resolved itself into a battle to secure the attention of people.

CHAPTER III.

PRESENTATION.

The Simplest Knowledge the Result of Complex Processes. — "I see a large red apple on that tree about two rods the other side of the road." Many persons would think this statement embodied the simplest possible knowledge, that there was nothing complex, nothing inferential in seeing a red apple on a tree at a little distance. "I simply use my eyes and see the apple," would be a common unthinking expression, and yet every power at the disposal of the mind is woven into the process that enables us to make the statement.

A person who opened his eyes for the first time and looked in that direction would see no apple. He would have only a sensation of a patch of red color, which would seem either to touch his eye or to be at no definite distance from it. He would not know to what this patch of color belonged; he would not have the remotest idea of the cause of the sensation. But an intelligent being would soon become interested in his sensations; thus, *emotion* would appear as a mental factor. He might turn his head away, lose the patch of color, and determine to find it again. Here the power of *will* would be at work. When he found the color, he might recognize it, and thus show that *memory* was active. His eye might again wander from the apple and rest upon the tree or a ruddy cloud beyond. He would now experience different sensations. He would not

know the tree and cloud as such; he would merely have a varying sensation of color. The moment he detected a difference, two more mental powers would be active, *perception*, and comparison or *thought*. Perception would investigate the sensations closely, and the comparing or thinking power would notice the likeness or difference. Every mental power would now be at work; but it will take much time and effort, before the sensation of red color can be translated into an apple.

Let us carefully go over these steps again in the case of this imaginary person exercising the sense of sight for the first time. (1) He has a *sensation* of a ruddy color from an unknown source. (2) He has *emotional interest* in this sensation. (3) When he loses it, he turns his head or eyes to find the source, and so employs *will*. (4) When he finds the color, he remembers it, and thus displays *representative power*, or *memory*. (5) He has other sensations, perceives them carefully, compares them, and notices a likeness or a difference. Here *perception* and *thought* appear together.

Before we can say that we see a red apple on a tree at a certain distance, we must not only have had sensations of sight which we voluntarily repeated because they interested us on the emotional side; we must not only have remembered these sensations, perceived them attentively, and compared them closely, so as to distinguish the ocular sensations due to the apple from those caused by the tree or by a ruddy cloud beyond: but we must also have had other sensations than that of sight from the apple. We must know it, if blindfolded, by tactile sensations; we must be able to distinguish its odor and recognize its taste; we must have noticed the sound when the fruit fell from the tree.

Some of these sensations will be indefinite compared with others; but, definite or indefinite, they must all be woven together by the mental powers into the complex product, an apple. From merely seeing an apple, one forms an idea very imperfect compared with that of a boy, who has eaten, smelled, and handled the fruit, and perhaps also heard it fall in an orchard or on the floor. In order that we shall again know an apple, or any other object presented to the senses, the sensations produced by it, and the inferences drawn therefrom, must be often repeated.

Before we can say that we see the apple at a certain distance, we must remember lights and shades and comparative sizes. We must have treasured up muscular experiences in walking or in throwing a stone, a certain distance, or in accommodating our eyes or rolling them around. Not until we can translate these complex experiences into distance can we say that the apple is so many rods away. Again, before we can know the apple as *large*, that is, as occupying space in three dimensions, we must go through such a complex process in comparing and discriminating our tactual, ocular and muscular sensations, that more than one philosopher has declared the skein of the processes leading to our knowing the apple in space, too tangled to be unraveled.

If we had to begin now and go through all the experiences and steps, entitling us to say, "I see a large red apple on that tree about two rods the other side of the road," we should be wearied with the complexity and slowness. It is well that the infant begins this process shortly after birth and that he has nothing else to do for a long time.

All Knowledge is a Resultant of all the Mental Powers. —What we have said about the apple contains the germ

of all psychology. We can only speak more fully of the processes and repeat in detail what has been said in a general way. If a flower is brought to us to name, we have, if familiar with it, a web of knowledge woven by the assistance of various sensations, memories, emotions, acts of will, perceptions, and comparisons. We know the flower and plant by the odor, color, shape of leaf, taste, and can distinguish them from all others by various signs.

The mental powers may not appear in the order in which we have named them. They never appear singly, for we cannot have even a simple sensation without also having an emotional element and discrimination connected with it; nor can we remember without comparing a present sensation with a past one. Yet it will aid us, in study, to isolate each of the processes, in the same way that we may consider the form of a house apart from its color. But all the mental powers are, at the same time, weavers at the loom of knowledge, and the product is a web so closely woven that it is often very difficult to pick out the separate threads.

Sensation.

Definition. — A sensation is a state of consciousness resulting from nerve action. When a stimulation of the retina by light is transmitted by the optic nerve to the brain so as to affect consciousness, the result is a sensation. No one can tell us why nerve action affects consciousness, but such is the fact. Sensations are not knowledge any more than wool is cloth. They are the raw material out of which knowledge is slowly spun. Sensation accompanies the exercise of the senses and the nervous system in general, when the latter is sufficiently aroused.

As we have seen, not all nervous action appears in conscious sensation, since a healthy nervous system is fortunately a machine which obtrudes no more of its business on consciousness than is sufficient to furnish the raw materials of knowledge. The capacity for sensation lies at the foundation of all knowledge. Innumerable things in nature cause sensations in the ear, eye, nose, mouth, skin, and muscles. Our knowledge of the world is merely the proper interpretation of these sensations.

Conditions and Limits of Sensation. — Four factors enter into the production of a sensation: (1) There must be a stimulus; in other words, there must be atmospheric vibrations for the ear, gaseous substances for the nose, etc. (2) There must be nerves capable of transmitting to the brain the effects of the stimulus. (3) There must be a conscious agent fitted to respond. (4) The stimulus must reach the brain in such a way as to cause a change in the conscious agent.

We know that our sensory nerves are capable of transmitting to the brain only a part of the phenomena of the universe. When the vibrations in the air pass beyond a certain limit, the ear hears no further sound. The vibrations are active, for some persons hear before the usual number is reached, while others continue to hear beyond the normal limit. The failure to hear does not stop the vibrations. Our senses, however, can tell us nothing of vibrations of the air more rapid than thirty-six thousand in a second. Vibrations of the ether produce no sensation unless they are more than 5 trillions in a second, when we get a sensation of heat. We begin to get a sensation of light when they are 392 trillions in a second. As they increase, we pass from one color to another until they reach 757 trillions

in a second, when everything is darkness. The eye can no longer grasp the resultant effect of increased vibration.

Thus we see that our senses give us only a section of the world's phenomena. If a visitor from another planet were to come to us with a request to be shown terrestrial animals, and if we admitted to his view only such as could pass through a hole of three square feet, we should do for him in an analogous way what our senses do for us. The visitor would, of course, not know that we had horses, camels, hippopotami, elephants, and whales. In the same way, our senses usher only certain phenomena into the presence of our minds. If we had three or four new senses added, this might appear like a new world to us; we might become conscious of a vast number of phenomena, which at present never have any effect upon our nervous organism. It is possible to imagine a race of beings whose senses do not resemble ours, inhabiting other worlds.

What We Really Know through Sensation. — Professor Ziehen rightly says: "It follows that the constitution of the nervous system is an essential factor in determining the quality of sensation. This fact reveals the obvious error of former centuries, first refuted by Locke, though still shared by naïve thought to-day, that the objects about us themselves are colored, warm, cold, etc. As external to our consciousness, we can only assume matter, vibrating with molecular motion and permeated by vibrating particles of ether. The nervous apparatus select only certain motions of matter or of ether, which they transform into that form of nerve excitation with which they are familiar. It is only this nerve excitation that we perceive as red, warm, or hard." We have already seen how the same water may seem both hot and cold at the same time to our hands.

The Quality of Sensations.

Causes of Difference in Quality.—Every sensation has *quality* and *intensity*.

Several factors determine the quality: (1) The different senses cause sensations of different qualities. A sensation of sound differs from that of sight. (2) The part of the brain into which the nerve current is poured has much to do with determining the quality of sensations from the same stimulus. If electricity stimulates the optic nerve, the effect is transmitted to the occipital lobes, and we have a sensation of light. If the same electrical current is applied to the auditory nerve, the stimulus flows into the temporal lobes, and we get a sensation of sound. (3) The location of the application of the stimulus changes the quality. If the same pencil is applied with the same force to the cheek, tongue, and eyeball, we get a different tactile sensation in each case. (4) The time for which a stimulus acts changes the quality. After the retina has been fatigued with gazing at red for a long time, a green color may be seen. Fatigue in the brain cells also ensues, and they do not respond in the same way. (5) The relation of one stimulus to a preceding stimulus changes the quality. This may be proved by tasting different substances, or by looking at different colors in succession. (6) The intermittent or moving character of a stimulus affects the quality. A crawling insect gives us a different sensation from a motionless one; the effects of a flickering light differ from those of a steady flame. (7) The emotional quality of sensations differs, according as they are pleasurable, painful, or neutral.

We shall now consider (3) and (5) at greater length.

(1) has been already dealt with in the first chapter and will be further considered under Perception.

Local Qualities of Sensation. — These are very important because they furnish perception with the data necessary to know our own bodies as extended, and other matter as extended by comparison with them. If we put the points of a pair of compasses a certain distance apart upon the skin, we shall notice two tactile sensations, and in feeling them as two, we know that they are in different places. To cover up a scar on the nose, a bit of skin was transplanted from a patient's forehead. When this patch of skin felt pain, his forehead seemed to ache, so definite were the proper local sensations from the grafted skin.

If a needle were thrust into the foot of a child of ten, he would be in no danger of thinking that the sensation came from his hand. There would be a local difference in the two sensations. This sense of difference becomes gradually more pronounced from infancy, as the discriminating mind notices the unlikeness in the sensations coming from various parts of the body. No mind can discriminate between things that are perfectly alike, hence there must be original local differences in the sensations.

Relativity of Sensations. — Sensations do not come separately. Each preceding one changes the character of subsequent ones. The following *law of relativity* may be formulated: All sensations feel the deflecting force of others, and differ because of their varying relation to others. As a person grows older, sensations become more largely resultants of related factors.

If any one gazes at a red object for a while and then looks at a gray object, it will appear green. A sound of one

pitch may cause an unusual auditory impression, if immediately preceded by a sound of a different quality. Every one knows how contrast changes taste sensations. We have already had the example of plunging a warm and a cold hand at the same time into lukewarm water. It has been well said that to see only one color would be to see no color at all, that black and white come out in their fullness only when placed beside each other. Our world of sight is made up of color contrasts, for the eye seldom remains fixed long on any one thing. A fusion of sensations always enters into our idea of a thing. Even when we take jelly into our mouths, the resultant sensation is due as much to touch as to taste.

It is important to remember the law of relativity, for then we shall not expect a person to get the same sensation as ourselves from a new object, if our previous sensations have differed. Thus, psychology teaches us to understand ourselves and others better.

After receiving a new sensation, the brain is a changed organ, and it will thereafter react in a changed manner.

The Intensity of Sensations.

Causes of Difference in Intensity. — This depends (1) on the intensity of the stimulus. The sensation of light from a candle is not so intense as that from the sun. (2) The massiveness of a stimulus of the same intensity affects the intensity of the sensation. We are affected differently by plunging one finger or the whole hand into very hot water. (3) The intensity depends on the attention we give to the sensation. If we center attention on every slight pain, it gathers in intensity and often unfits us for doing our duty. (4) The intensity depends on the condition of

our mind and body. If we have a headache, a noise that we should not ordinarily notice may seem unbearable. If we are interested in reading, we may not hear the clock strike. (5) Contrast affects the intensity, as we saw in the preceding section.

It should be added that the intensity of a sensation may change its quality, and many of the factors in the quality may change the intensity.

The Threshold of Sensation. — There is always inertia to be overcome in rousing nervous matter. A certain amount of stimulus is expended in this. If no more is added, there is no sensation. When the inertia is once overcome, the sensation will persist for a time after the cessation of the stimulus. Atmospheric vibrations at the rate of 10 per second do not sufficiently stimulate the brain to render us conscious of sound. When they reach a minimum of from 16 to 30, they enter the threshold of human consciousness; and at a maximum of 36,000, they pass out by the upper threshold. The cat can hear sounds inaudible to man, and hence has a lower aural threshold. This threshold is not constant, as any one may determine by placing a watch at such a distance that its ticking is just heard. At intervals of about three seconds this will cease to be audible for a short while. Nerve currents, as well as attention, seem to have wave-like characteristics.

Weber's Law. — To increase the intensity in a sensation, a more than corresponding increase in the stimulus is necessary. Fechner stated the law thus: The sensation increases in proportion to the logarithm of the stimulus.

Within certain limits, any sensory stimulus may be

augmented without increasing the sensation. We should not perceive increased intensity in a sound when augmented one fourth. An ounce might be added to two pounds without detection by the pressure sense. The additional stimulus necessary to increase the intensity of a sensation varies for different senses. Sound must be increased one third; light, only one one-hundredth.

This law has only approximate validity for stimuli of medium intensity. When a light gets as bright as the eye will endure, a light one third brighter will not cause an increase in the sensation of light. The gazer at the sun will be blinded, and if an object were twice as bright as the sun, the sensation from gazing at it would be other than that of increased light. Again, with minor stimuli the law has not absolute validity. A strained attention might perceive an increase in a sound when the stimulus was increased less than one third. As attention never remains constant, the precise amount of stimulus necessary to increase a sensation will vary in actual life.

The important truth deduced from this investigation is that a doubled stimulus does not necessarily double the amount of sensation.

Perception.

Functions of Perception. — Perception is that power which interprets the raw materials given by sensations. Perception, always aided by the other faculties, gives us our first exact knowledge. Perception may interpret a dark blue color as a bunch of grapes; a patch of red as an apple; a rough, prickly sensation as a chestnut bur. An infant has indefinite sensations — not interpreted into the grape, the apple, or the bur. To the infant, everything

from the taste of sugar to the touch of silk appears in consciousness in a hazy way, simply as a sensation.

To our mental ear sensations are all the while speaking, but their language is unintelligible until perception interprets it. When an Arab was tried in one of our criminal courts, his words caused sensations in the judge's ears but conveyed no meaning. An interpreter was called to translate the words. Perception is the interpreter employed by sensation. As we grow older, we understand more fully that a sensation does not exist for itself, but only for what it signifies to perception. We soon cease to pay much attention to the visual sensations coming from individual letters or objects, but hasten to the perceptional and rational significations. A hungry person loses little time in hurrying from a sensation of white and brown to the perception of a slice of bread or cake.

All the Mental Powers are Represented in Perception. — We name every mental state from its dominant element, just as we call a certain ore "iron," although it also contains phosphorus and sulphur. Sensation and perception are closely connected with nerve currents flowing into the brain, while memory and thought need have no such immediate connection; yet perception could not advance a step without aid from the other mental powers.

Let us take a concrete example to make this clearer. As we walk in June, our eyes give us a *sensation* of a patch of red color. *Memory* recalls another sensation. *Thought* decides the two to be similar. We feel *emotional interest* in the patch of red color and *voluntarily* attend to it. We before found that such a patch of red color could be translated into a strawberry. Thought says that this is a similar patch, not such a one as might come from a

cherry; therefore this patch of color can be translated into a strawberry.

When we perceive the strawberry more closely by plucking and eating it, we again traverse the same mental ground. We have a sensation of taste. Were we blindfolded or in the dark when the berry was thrust into the mouth, we should compare the present taste sensation with one before experienced, and conclude that this resembled a former sensation due to the taste of a strawberry. We should feel interest, and voluntarily center attention on the sensation and the process of remembering and comparing.

Perceptional Interpretation of Special Tactile Sensations from External Objects. — When we touch sandpaper, glue, polished marble, velvet, and steel, we have sensations from rough, sticky, smooth, soft, and hard substances; and these sensations have different qualities which perception notes and assigns to different substances. From the interpretation of these tactile sensations, we form more and more definite ideas of the sandpaper, glue, marble, velvet, steel, and all other matter with which we come in contact. We are handed something in the dark and get a sensation of roughness; we then proceed to translate that sensation into a file. The object may give a temperature sensation of coldness, which we translate into ice. Our cheeks are touched in the dark, and we experience a sensation of softness, which perception interprets as coming from a feather.

Should we experience a tactile sensation unlike any that we had ever before felt, we should need to have it repeated, to pay voluntary attention to it, to compare it with other sensations, before perception could interpret it. If a person had few sensations from touching a peculiar, cold, clammy substance in the dark, he could not readily

translate them into a lizard. If, when groping around in the pantry, he received a sensation with which he was familiar, he would at once translate it into the proper object or substance. This interpretation would be tactile perception.

Perception of the Bodily Self in Contrast with External Objects. — When we touch our own bodies, we get a double sensation of touching and being touched. This dual sensation differs from that experienced from contact with outside matter, and so we begin to form an idea of self as contrasted with external objects. Whenever we note a difference between things, our ideas are sharpened. Before the infant grows very old, he notices a difference in the sensations received from striking himself and the cradle. At first the infant does not know the limits of his own body. When old enough to nibble at a biscuit, infants have been seen to offer one to their foot to eat, as if that were some disconnected object. Contact with other things, often resulting in bumps and bruises, finally enables the child to know the limits of his frame. The moment he begins to get such knowledge, he marks off the external world from his own body. The child then no longer looks with astonishment at a wriggling foot. The mental gaze is turned toward the outside world, to perceive that.

Interpretation of the Local Qualities of Tactile Sensations. — Touch gives sensations of local difference. We can feel the points of a pair of compasses, now farther apart, and now closer together. Perception uses such data in determining distance. Widen the interval between the two points on the same part of the body, and perception says, "I translate into distance this changed sensation, due to the widening of the space between the points."

If we had compasses with three points, so that each could touch a different part of the wrist, or if we used three of our fingers in the same way, we should have three local sensations from points not in the same plane surface. Three such different points can be included only in a body that has magnitude, or extent in three directions. From such data, perception gives us an idea of our wrist as a body of three dimensions. We then proceed to compare objects in the external world with parts of our bodies, and to know such objects as distant from us and as having magnitude.

Perception, using the different local data from tactile nerves, places sensations in various definite parts of the body. The infant experiences pain in an indefinite somewhere. Perception watches the difference in sensations from various localities and assigns these sensations to different parts of the body. It is not unusual for persons to complain of feeling pain in an amputated limb. A man had the misfortune to lose a foot on which was a troublesome corn. He afterward complained that this corn gave him great pain. The explanation is that sensations were still conveyed to the brain by the same nerve which formerly connected with the corn and brought sensations from it. When the exposed end of the amputated nerve afterward conveyed sensations, perception located them in the same place as before. Prior to amputation, the nerve was affected at its extremity in the foot, and the same inference continued to be drawn from subsequent sensations, due to stimuli at the exposed root of the nerve.

Interpretation of Combined Tactile and Muscular Sensations. — By the blending of our muscular and tactile sensations, perception is enabled to translate the combined data into far more definite knowledge. When we exert the

proper muscles strongly, we seem to get a sensation all the way through our wrists or arms. The massiveness of these sensations gives us a more direct idea of our limbs as bodies of magnitude. In actual life, muscular sensations always blend with local tactile ones to give perception additional data for perceiving the magnitude of our bodies, and, by comparison, the size of external objects.

A slight bruise to one of the muscles of a finger gives a less massive sensation than a larger bruise on the arm, trunk, or leg. A sensation from a carbuncle or a sprain is more massive than from a needle thrust into a muscle. When we lift twenty pounds, the sensation is more voluminous than when we lift two. When we swing our arms or move them around the exterior surface of some object, when we walk or run, when we press against something heavy or light, — we get different muscular sensations. Perception busies itself with noting and interpreting these differences. From more or less massive muscular sensations due to (1) physical conditions, (2) movement, (3) pressure, (4) weight, we get data which perception uses as a basis for interpreting the magnitude, weight, and resistance of bodies in space. When a blind man wishes to form an idea of the size of a table, he moves his hand around it and tries to reach across it. He relies entirely on sensations from his muscles and nerves of touch.

Muscular and tactile perception is thus a process of translating the external world into greater or smaller masses in terms of our bodies. Thus, we say the house is so many "feet" wide; the horse, so many "hands" high; the tree, so many "steps" away, or a "stone's throw" distant. That is, there is the distinct element of the muscular effort involved in taking those steps, or in throwing a stone. We translate these muscular sensations into distance.

Perception by Visual Sensations. — No sense better illustrates the interpretive office of perception than sight. A glance at the "raw materials," or different visual data, will make this plain.

We have (1) sensations of light and color; (2) normally, two retinal images from one object; (3) each image mirrored bottom side up on the retina; (4) part of the fibers from the optic nerve of each eye crossing over, and thus transmitting the sensation to the opposite side of the brain.

Hence nothing can be more unlike our idea of a thing than the strictly visual antecedents. Consider them in the case of a church, for example. The retinal image has the spire pointing downward, the foundation upward. There are two such images of one church. Some of the fibers of each optic nerve transmit the sensation to the side of the brain opposite to the receiving eye. Such sensations are no more like a church than the word "church" is like the object. Perception, by a peculiar power of its own, translates such bewildering data into one church in the right position in space.

Muscular Sensations Aid in Visual Perceptions. — Every time we move our eyes when looking at things, we have *muscular* as well as visual sensations. We saw that the eyeball is turned in its socket by various muscles. These incline the eye upward, downward, sideways, and obliquely. With every change in movement there is a change in the muscular sensation. When we look at a near object, there is different muscular tension from that experienced when looking at a distant one. We have already seen that muscular, joined with tactile sensations, supply perception with data for estimating the distance and the magnitude of an object. The data given by mus-

cular sensations in connection with the eyes are just as valuable as in connection with any other sense. These data aid us in visually perceiving objects of three dimensions at the proper distance.

Ocular Movements. — We are all familiar with (1) the muscular sensations due to turning the eyeballs in their sockets. When we glance at the top of a tree or spire to estimate its height, there is a muscular sensation from rolling the eyes upward. If we incline them downward to note the distance from a roof to the street, to the bottom of a well, or to the base of a hill; if we look askance or out of the corners of our eyes at a passing person, — we get differing sensations. (2) If we roll both eyes inward, or converge them, to look at a near object; or, (3) if, in focusing the eye for near or remote objects, we render the lens more or less convex by pulling it with the ciliary muscle, — in each case we get a characteristic sensation according to the distance.

These movements suppose the possession of two eyes. A one-eyed person loses the sensation from convergence. If we hold a needle a foot from our eyes, we must direct them toward each other, or converge them, to see it. If we close one eye and try to thread a needle, we cannot hit the needle's eye as accurately as when we look at it with both eyes. A one-eyed person also loses half the sensation due to focusing, hence he cannot so well judge of distance.

Purely Visual Sensations Furnished to Perception. — (1) Different rates of vibration in the luminiferous ether affect the retina differently, and thus cause sensations of color. (2) More or less light comes from the same object according to its distance. (3) The retinal image varies in

magnitude in inverse proportion to the distance of the object. (4) A body of three dimensions, because seen at a different angle by each eye, does not cause the same image in each eye. If we look at the corner of a book, alternately closing each eye, the right eye sees a little more of one side, the left eye more of the other. This varying image becomes a direct sign for perception to note that bodies have magnitude. When we join to this purely visual sign the muscular and the retinal sensations due to ocular movement, we have all the visual data enabling perception to judge of magnitude, and to determine distance; but it must not be forgotten that perception translates these data into a language of its own.

How Perception Constructs a Field of Vision. — When a surgical operation has enabled the blind to see, they have invariably at first declared that objects either touched their eyes or were at no definite distance from them. A landscape with a hill and a forest in the background, a pasture with cattle and sheep, a brook with a growth of willows and a white farmhouse in the foreground, were first seen only as blotches of color touching the eye. Not a single individual element of the landscape was at first perceived. The blotches of color due to the farmhouse and cattle were not translated into their proper objects. It is the task of perception to find out what such confused sensations of color mean. Only after considerable experience could these persons translate this patch of color into a farmhouse and that into a sheep or a cow, at a proper distance. Infants may amuse us by stretching out their hands for a star or the moon, but a man of thirty just given the power of sight might do the very same thing.

Perception learns how to construct a field of vision in

several ways:—(1) The *size* of the retinal image and the consequent intensity of the sensation vary with the distance and magnitude of an object. If a distant eagle looks to be about the size of a mosquito near by, we conclude that the eagle must be from a quarter to a half of a mile away; because on previous occasions we have found that certain objects, to form a retinal image of that size, must be at a given distance, and that, as we approached the object, the retinal image grew larger. In *King Lear*, Shakespeare uses these words to convey an idea of the height of a cliff:—

> "The fishermen, that walk upon the beach,
> Appear like mice."

(2) We judge of the distance or depth in space by (*a*) variations of *light and shade*. The painter by imitating this color quality in natural objects gives us an idea of perspective on canvas. (*b*) The *sharpness* or *dimness* of outline enables us to estimate distance. The artist will not paint a remote object with as distinct an outline as a near one. When we look at objects through a fog, the retinal image is the same size as if there were no fog, but the indistinctness suggests vast distance. An object would have to be very large to produce a retinal image of that size at such a distance. Hence a comparatively small object often seems immense.

(3) The number of *intervening objects* affects our perception of distance and extent of space. A landsman at sea has a very poor idea of distance, because on the land he has been accustomed to form his estimates by the help of intervening objects. A person was once heard to exclaim that a certain harbor had doubled in size since the day before, when no vessels were at anchor there. During the night

a storm arose; many vessels sailed into the haven, anchoring at irregular intervals, and causing its apparent increase in size. When the moon rises, it frequently appears very large. There are so many objects intervening between us and it, that we unconsciously think it at a greater distance than when it is near the zenith. As an object must have increased in size in order to give a retinal image of the same size at a greater distance, we infer that the magnitude of the moon is increased when we gaze at it as it rises.

(4) The *motion* of objects across the field of vision, either by movement of our own eyeballs or of our entire persons, affects our idea of distance. The retina has only one small spot which images things with the greatest distinctness. Since clearness of image is one of the means by which we judge of distance, the importance of movement is manifest. Infants have been observed to move their eyes so as to bring out the image more distinctly.

Again, when traveling by rail, we can judge of the distance of objects by the rapidity with which they pass the field of vision. A near object seems to travel much faster than a remote one. A telegraph pole near the track will whiz by, while a distant tree will appear to have a much slower motion.

(5) The use which perception makes of the *muscular data* in connection with rolling the eyes, converging and focusing them, has already been sufficiently noticed.

The field of sight is therefore a perceptional interpretation of many complex data of sensation.

Quickness of Perception. — After visual perception has, through experience, become definite, a flash of lightning will reveal the individual elements in a landscape in their

proper positions in space without help from the muscular sensations involved in using the eyes. Dr. Ziehen says: "We find the wonderful rapidity with which this arrangement of the sensations is accomplished inconceivable; at once and without a moment's thought the image is before us, well arranged and unmarred by the slightest error. To be sure, a process of evolution extending through almost endless ages was necessary to produce and train a cortical (cerebral) apparatus of vision that can react with such fitness. The newborn animal or child inherits this apparatus. Each single individual does not need to acquire it again laboriously, but only to learn to use it." In some respects the brain of a young chicken, quail, and partridge is more wonderful than that of man, for almost as soon as hatched they perceive an individual object in space at the right distance. They will peck at an insect with the proper amount of muscular effort, and will not run against objects in their path, as a man would after having been restored to sight.

Perception by Aural Sensations.— We saw, in discussing the sense of hearing, that certain different sensations, due to pitch, intensity, quality and harmony, accompanied the use of the ear. These are the raw materials from which perception constructs its world of sound.

In actual life we (1) locate sounds in space, and (2) assign them to their causes. A sound seldom affects both ears with equal intensity, hence we obtain a clue to the direction of the sound. We assign sounds to certain distances in space, largely on account of their intensity. We put the faint roar of a locomotive at a great distance.

Aural inferences often land us in error. A person, one

summer evening after retiring, became very restless because he was sure that he heard a mosquito. The steps by which he reasoned up to that conclusion were these: —

On previous occasions a mosquito was the cause of such a humming sound.

The present case resembles those former instances.

A mosquito is, therefore, the cause of this noise.

On this occasion, however, the sound which he really heard was the low whistle of a distant locomotive. He was misled by the similarity of the sounds into the inference that the noise was due to a mosquito. The mocking bird, the catbird, and the ventriloquist are frequently the cause of erroneous inferences.

As our experience widens, we learn to associate sounds of various qualities with the objects which produce them. In the dark we could tell that certain sounds were caused by a harp, a piano, an organ, a flute, a dog, a lamb, a cow, or a bird.

The perception of harmony depends partially on agreeable sensations due to a peculiar stimulus of the auditory apparatus, and partially on the discrimination and comparison of aural sensations.

Aural Perceptions not so Accurate as Those of Sight and Touch. — While it is probably true that the interior of the ear has delicate muscles and tactile nerves which give signs to aid in the perception of sounds in space, it is a fact that these data, added to those of intensity and unequal stimulation of the two ears, do not enable perception to localize sounds with trustworthy accuracy. The United States Hydrographic Office, in order to give warning of the untrustworthiness of fog signals, has printed in red ink on

some of its pilot charts that there are "shipwrecks caused by the insistence of mariners on the infallibility of their ears, who have accepted unquestioned the guidance of fog signals as they do that of lighthouses during clear weather. Audition is subject to aberrations, and under circumstances where little expected. Implicit reliance on sound signals often leads to danger, if not death."

Perceptions of Smell. — We have seen that sensations of smell do not admit of accurate classification. They occupy a relatively small place in the mental life of most persons. In the case of many brutes, however, we find that smell is the most accurate sense. The dog will recognize his master and track game most easily by the odor. Our olfactory perceptions are most alert for those sensations which indicate the presence of something harmful or pleasant, hence odors are most commonly classified as putrid and sweet.

By experience we learn to connect many odors with the objects emitting them. An odor from an unseen source comes in through the open window, and we say, "How sweet those roses smell," or, "There must be a magnolia tree in blossom somewhere near," or, "They must be having codfish for dinner next door." Where persons are both blind and deaf, the number of the acquired perceptions of smell is frequently astonishing. Dr. Howe, in the *Forty-third Report of the Massachusetts Asylum for the Blind*, is authority for the statement that Julia Brace, a blind and deaf mute, could instantly recognize a person she had met before as soon as she caught the odor from his glove or hand. This sightless girl was actually employed to sort all the clothing of pupils after it came from the wash. Her power of smell, in definiteness and

vividness, must have surpassed the sense of sight in most persons.

Perceptions of Taste. — Perception distinguishes easily between four taste sensations, — bitter, sweet, sour, and salt. There are also numerous others which are products of both taste and smell. When, in the dark, we distinguish one article of food from another, perception is interpreting taste sensations. How much such perceptions depend on sight and smell is well brought out when "taste prizes" are given. The tasters have their eyes covered and a bottle of perfumery held under the nostrils while some one puts food into the mouth. Mistakes are very common in the case of such common edibles as chicken, turkey, veal, beef, lamb, venison, and quail.

Some persons make it their business to cultivate perceptions of taste. The definite conclusions reached by tasters of teas and wines seem almost miraculous. Savarin, a French writer on taste, instances Roman epicures who could decide from the taste of fish whether they lived above or below a certain bridge, and he also tells us of modern gourmands who knew from the taste of the joint on which leg a partridge was accustomed to sleep, and of connoisseurs who could tell under what latitude a wine was produced as accurately as an astronomer can predict an eclipse.

Reasoning Involved in Perception. — As we shall see later, comparison is the basis of reasoning. When we perceive, we compare one sensation with others, or with the memories of others. Not until we notice a likeness and a difference between sensations can we perceive. If the sensations from a tree and a sheep were the same, we could not tell them apart. Sometimes frescoing deceives us

because the ocular sensations from that and from carvings in relief are the same.

The mental process in the case of a person who touched a chestnut bur in the dark would be this: —

Sensations from a chestnut bur alone have this peculiar rough quality.
The present sensation has this quality.
This sensation must come from a chestnut bur.

In translating a visual sensation into an orange, we should reason thus: —

Sensations of this peculiar quality have previously been found to be caused by an orange.
The present sensation has this quality.
The present sensation is caused by an orange.

If a rose were held close to our nostrils in the dark without touching them, we should translate the olfactory sensation into a rose in this way: — Previous odorous sensations similar to this have been due to a rose, therefore this must mean a rose. If a piece of peach were put into the mouth when we were blindfolded, we should at once interpret the sensation as due to a peach, because of resemblance to previous sensations from tasting peaches. We hear a peculiar resonant noise and say that some one is beating on a drum, because previous similar sensations have been found to spring from such a source.

Transferred Perceptions. — A transferred perception is one that takes data from one sense in order to draw a conclusion that primarily depends on data furnished by another sense. Perception may draw tactile conclusions from the sense of sight, visual conclusions from the sense of touch, in short, any conclusion immediately proper to one sense from any other sense. We glance at a chestnut bur and

say that it looks rough. The sense of touch alone can primarily determine whether an object is rough. We conclude that the bur is rough because certain variations of light and shade have been found to be associated with uneven surfaces. The process of reasoning employed is as follows: —

All substances with this appearance have, when touched, proved to be rough.

This substance has this appearance.

It will prove rough to touch.

The doctor taps on a man's chest and hears a dull sound. The physician at once says that tubercles have formed, although he can neither see nor touch them. He plainly cannot hear them, and yet he decides from the sound emitted that they are there. He reasons thus: —

Autopsies have proved to sight and touch that previous cases of a peculiar lack of resonance were due to tubercles.

This case resembles those.

An autopsy would prove to sight and touch the existence of tubercles in this case.

If the physician could not have used transferred perception, he would have been compelled to cut the patient open in order to demonstrate by sight and touch the existence of the tubercles. The importance of the transferred perceptions is apparent. We can determine from the sound by tapping on a barrel, without the trouble of unheading it, whether it is empty. Without such perceptions as these, we could not tell from the sense of sight, that a glowing red iron would feel hot. We should be obliged to touch it.

Mature perception employs the sense most easily used to draw conclusions for another sense. As we grow older,

we save a vast amount of time and trouble in this way. The larger part of our knowledge comes through inference.

What is a Perceived Object? — A perceived object is one known to have a certain place in space, to possess certain qualities believed to inhere in it, and to exist now in regard to time. It is the business of perception to localize and objectify. We perceive an apple visually when we have placed it at the proper distance on a tree, and when we have projected the color sensation from our eyes into the apple. In other words, we locate the apple and transfer the sensation of color from our subjective sense to the object, the apple. Perception always regards a sensation as a quality belonging to some object.

A perception of a thing is not a product of one sense, but a fabric woven of material from all. An apple is an object our idea of which is formed from tactile, muscular, visual, auditory, olfactory, gustatory, and temperature sensations. Knowledge of the apple gained through sight alone would be very incomplete.

The fusion of sensations into a finished perceptional product is absolutely necessary. A blind man, from sensations of touch, was very familiar with a cat. When he was enabled to see, he did not recognize her when she came into the room. He had to pick her up before he knew what such a visible object was. Even after he had handled her and looked at her at the same time, he was a long while in so fusing his sensations that he could recognize her by sight.

The explanation of the origin of our ideas of space and time must be left to metaphysics. It is the business of psychology only to notice how the mind actually works, not to explain how it is possible for it to work thus. The physicist does not try to explain how matter origi-

nally got the power of exerting the pulling force of gravity across millions of miles of space. He simply notices how that force actually works, and he finds out that the power of gravity is inversely proportional to the square of the distance. So the mind has the power of locating its own sensations in matter, — transferring the color and taste to the strawberry, the sound to the organ, the odor to the rose, the sensation of softness to the feather. We have shown the steps in the process, but have not explained how the mind originally got the power to take a single step.

Apperception.

Meaning of the Term. — This term is frequently met with in German writers; although some modern psychologists decline to use it, we may acquire a new point of view of our mental life by regarding apperception as the perception of things in relation to the ideas which we already possess. An illustration will make this definition clear. There is a story of a boy who concealed himself in a tree and watched the passers. When one man remarked to his friend what a fine stick of timber the tree would make, the boy said, "Good morning, Mr. Carpenter." Soon another passer said, "That is good bark." "Good morning, Mr. Tanner." Presently a young man remarked, "I'll venture there's a squirrel's nest in that tree." "Good morning, Mr. Hunter." In one sense those men saw exactly the same tree, had the same sensations of color and light from the same object; but from the way the men apperceived the tree, the boy was able to tell their leading vocations. Each apperceived the tree in terms of his most prominent experience.

In one sense perception is an apperceiving process, for

each new sensation is biased by previous sensations; each new perception, by previous perceptions. Association is one form of apperception; thinking, another. For this reason we shall treat the subject very briefly here, but we shall return to it under the guise of association and thought.

The Apperception of an Object Differs with Individuals. —We always see things in terms of our past experience, and not as the things actually are. The truths of our world are determined by what we see, but we for the most part see only those things which we can join to something in our line of experience. Other things do not exist for us. Their truths are not a part of our world. The brain is a changed organ after each sensation or perception. Any new perception must feel the deflecting force of former perceptions.

A woman may apperceive a passing bird as an ornament to her bonnet; a fruit grower, as an insect killer; a poet, as a songster; an artist, as a fine bit of coloring and form. The housewife may apperceive old rags as something to be thrown away; a ragpicker, as something to be gathered up. A carpenter, a botanist, an ornithologist, a hunter, and a geologist walking through a forest would not see the same things. These men would have brains which would respond differently to the same stimuli. The ornithologist might hear every bird note; the botanist with equally keen ears might not have an auditory sensation of sufficient intensity to affect consciousness.

Brief Statements of Some Important Apperceptive Truths. —I. When we look at a new object, memories of sensations from partially similar past objects will always exert a deflecting force. When the South-Sea Islanders first

saw a goat, they apperceived it as a hog, with which they were familiar.

II. We must know the entire previous history of a man's consciousness to be able to tell how he will see a certain thing, for memories of past sensations bias his ways of regarding it. The judges of the Supreme Court and the members of a jury often bring in a different verdict from precisely the same testimony.

III. The expression, "None so blind as those who will not see," often means, none so blind as those who cannot see. Past sensations and perceptions have biased the man so that he has only one point of view from which to regard the fact. The owner of a silver mine must be expected to look at its product differently from other people. The slave was a different being in the eye of his master and of those who owned no slaves.

IV. Later in life perception comes either to disregard new sensations or to forcibly liken them to old ones. It works like the fabled Grecian monster, who made all guests fit his bed: if too tall, he cut off their feet; if too short, he had the visitors stretched. Thus men become what are popularly termed "old fogies." They regard a new discovery or fact in an old way. They assured Columbus that men could not walk on the opposite side of the earth with their heads down and their feet up.

V. Whatever we learn early in life will influence us for all future time. If we are taught to regard a thing in a certain light now, all our subsequent perceptions will be colored by that light. An intelligent man said that he disliked Milton and had read but little of him. That man acquired that way of regarding Milton from a former teacher. If we go with vicious associates who have false views of life, they may soon become our views and all our

subsequent actions may be colored by them. We may as well expect our bodies to escape the force of gravity as our minds to elude the deflecting power of all former associations and experience.

Illusions.

Causes of Illusions. — We shall here consider only those cases of illusion where the external object does not correspond to the perceptional idea.

I. There is sometimes *primary illusion* of the senses. Whenever gray looks green on a red background, the eye deceives us, for its primary business is to report shades of color correctly. Whenever we see one object double, the cause of the illusion is not due to mental inference, but to lack of correlation in the organs of sense. The senses would foist more illusions on us than they do, were it not for the fact that the mind refuses to heed these illusory sensations.

II. There are illusions due to *misinterpretation* of external objects. A lace curtain in a moonlit chamber is taken for a ghost. A bush in the darkness becomes a robber or a wild beast. In these cases an external object exists, but it is misinterpreted. Imaginative activity builds a large structure on a very slight foundation of reality. A white garment hanging up in an indistinct light makes some persons sure that they have seen a ghost.

When one part of a newly perceived object is the same as part of something formerly seen, the like part tends to set in action the entire brain tract formerly engaged in perceiving the known object. Relying on a quick glance out of the window, we could take an oath that we saw a certain friend coming. We afterward find that he was not in town

that day. The hat and height of the person seen indicated our friend. These set in action a portion of the brain tract formerly concerned in seeing our friend, and the excitement spread until that entire tract was as active as if sensation currents from actually seeing the features of the friend had poured into those brain cells. A person wishing to purchase Madame D'Arblay's works, saw them catalogued on the page before him, just as his attention was called away for a second. He was amazed to find that her name had disappeared from the page when he looked at it again. He had really seen the name of Madame D'Aulnoy. The similarity of the first part had aroused the brain tract concerned in remembering Madame D'Arblay, and he was sure that he saw her name.

III. There are illusive perceptions due to no present external cause. These internally originated illusions are often called *hallucinations*. Our dreams are common illustrations of these. We seem actually to see wild animals chasing us, to be behind a runaway horse, etc. The cause of these imaginary perceptions is in our brains.

A cerebral memory cell may sometimes be roused to as great activity as if a current from actually perceiving that object poured into that cell. Owing to intense longing for an absent friend, a certain brain tract may have the same activity as when we saw him. The sign by which perception judges being the same in both cases, we actually seem to see him. We have already noticed that perception will not always enable us to tell whether a bell is still ringing, or we are merely remembering the sound.

Sometimes a diseased condition of the nerves will cause illusions. The optic nerve may transmit sensations of sight without external cause. The abnormal condition of auditory nerves may cause us to hear sound.

CHAPTER IV.

THE CULTIVATION OF PERCEPTION.

Time for the Cultivation of Perception. — Youth is preeminently the time for cultivating any of the faculties. An ounce of effort then will avail as much as a ton of effort later. Of all the mental powers, perception is the most difficult to cultivate after the age of twenty. If a person is not a good perceiver by that time, in ninety-nine cases out of a hundred he will never become one. He may cultivate the thinking faculty with great success in the twenties, not so the perceptive.

There is an immense amount of energy in the young which needs direction, and it is most properly directed when used in becoming acquainted with the world. At birth, man comes into a strange land which he must learn to know through perception. This is certainly a sufficient outlet for his energies for many a day.

If young people are so fortunate as to go around with an acute observer, their energy will be naturally turned in the right direction. They will speedily try to rival each other in acute perception, when they notice that he, in his rambles, observes every wild flower, every bird, every curiously shaped leaf, every insect and wild animal. Houdin, the magician, spent a month in cultivating his perceptive faculties and those of his son, by looking very carefully as they rapidly passed the window of a toyshop

or other store making a large display. Then each noted down the number of things that he had seen. Here the superiority of youth over age was manifested. The boy became so expert that one glance at a window would enable him to write down forty different objects.

Keen Perceptive Faculties Demanded for Success and Enjoyment. — This world is an organized body for shoving the ignorant or incapable to the wall, that their space may be better occupied by fitter persons. Darwin announced this truth by the famous expression, "the survival of the fittest." Excellence in perception is one of the factors that enable a person to survive in competition, which grows fiercer every year. The tricks of trade are many, and they claim as their special victims those whose perceptive powers are deficient. A lady went into a certain store to buy a lace collar. It so happened that none but the cheaper grades were in stock, and these did not suit her. The tradesman soon saw that she could not tell the difference between a fine and a coarse grade, or a machine and a hand made article, so he kept making new discoveries in his stock and raising the price each time. He noticed that she was better pleased as the price rose, and so he sold her "a fine imported" specimen for twelve dollars, which was eleven dollars more than he had at first asked her for the same grade. This was a case where careful inspection could have detected the fraud.

Cultivated perceptive faculties are as important for enjoyment as for material success. A shrewd Scotchman remarked that many persons well versed in books got only a small fraction of possible enjoyment from traveling. No matter whether they went on a simple Highland excursion or over the continent of Europe, they saw but little, because

they had never been trained to habits of close observation. Many a person, after returning from a foreign tour, reads works of travel describing the same localities, and wonders why he saw so little when others saw so much.

One misses three quarters of the enjoyment coming from many literary masterpieces, if he cannot interpret and feel them in the light of his own perceptions.

> "Meadows trim with daisies pied,
> Shallow brooks, and rivers wide."

There can never be sympathetic interpretation of passages like this, unless they awaken memories based on similar perceptions. Fortunately most of us, as well as the poets, can see without cost the brooks, meadows, flowers, flocks, clouds, and stars.

Books versus Perception. — With the cheapening of books and the resort to them for information on almost all subjects, perception threatens to become a lost art. The young ought to be taught not to read about anything which they can see for themselves, until they have first learned all they can by the aid of their senses. Whatever any one discovers for himself will be much better known than what he reads about or has some one tell him. The Indian who had never read a book never failed to notice an upturned leaf, a broken twig, a film of smoke, a slight indentation of the ground, or anything that served to indicate the presence of an enemy or of game. The hunters of Kentucky found that they must either go to the wall in competition with the red man or cultivate their perceptive faculties so as to cope with him better. The hunters set to work with a will to make use of their senses and soon saw as much as the Indian.

One reason why some uneducated men are so successful in business is because they are such excellent observers. Instead of poring over books, these men, moving around in the busy world, learn facts at first hand. The head of a large firm, when asked why he employed such an ignorant man for a buyer, replied: "It is true that our buyer cannot spell correctly, and he has probably never read a book through, but when anything comes within range of his eyes, he sees all there is to be seen. He buys over a million dollars' worth a year for us, and I cannot recall any instance when he failed to notice a defect in any line of goods, or any feature which would be likely to render them unsalable. I shall never put in a bookish man as a buyer, because he will not see anything unless a book first points it out to him." This business man's verdict was the result of observation, which he said was superior to theory. While there is nothing that forbids a proper combination of books and the use of our senses at first hand, such a combination is seldom made.

Longfellow's stanza, relating to Agassiz, shows that the printed page did not yield the great scientist the most important or the most interesting facts: —

> "And Nature, the old nurse, took
> The child upon her knee,
> Saying, 'Here is a story book
> Thy Father has written for thee.'"

Necessity of Concentrated Attention. — A body may be imaged on the retina without insuring perception. There must be an effort to concentrate the attention upon the many things which the world presents to our senses. A man once said to the pupils of a large school, all of whom had often seen cows: "I should like to find out

how many of you know whether a cow's ears are above, below, behind, or in front of her horns. I want only those pupils to raise their hand who are sure about the position and who will promise to give a dollar to charity if they answer wrong." Only two hands were raised. Their owners had drawn cows, and in order to do that had been forced to concentrate their attention upon the animals. Fifteen pupils were sure that they had seen cats climb trees and descend them. There was unanimity of opinion that the cats went up head first. When asked whether the cats came down head or tail first, the majority were sure that the cats descended as they were never known to do. Any one who had ever noticed the shape of the claws of any beast of prey could have answered that question without seeing an actual descent.

Farmers' boys, who have often seen cows and horses lie down and rise, are seldom sure whether the animals rise with their fore or hind feet first, or whether the habit of the horse agrees with that of the cow in this respect. The elm tree has about its leaf a peculiarity which all ought to notice the first time they see it, and yet only about five per cent of a certain school could incorporate in a drawing this peculiarity, although it is so easily outlined on paper. Perception, to achieve satisfactory results, must summon the will to its aid to concentrate the attention. Only the smallest part of what falls upon our senses at any time is actually perceived.

How to Perceive Things. — To look at a thing intelligently is the most difficult of all arts.

The first rule for the cultivation of accurate perception is: Do not try to perceive the whole of a complex object at once. Take the human face as an example. A man, hold-

ing an important position to which he had been elected, offended many people because he could not remember faces, and hence failed to recognize individuals the second time he met them. His trouble was in looking at the countenance as a whole. When he changed his method of observation, and noticed carefully the nose, mouth, eyes, chin, and color of hair, he at once began to find recognition easier. He was no longer in danger of mistaking A for B, since he remembered that the shape of B's nose was different, or the color of his hair at least three shades lighter.

This example shows that another rule can be formulated: Pay careful attention to details. We are perhaps asked to give a minute description of the exterior of a somewhat noted suburban house that we have lately seen. We reply in general terms, giving the size and color of the house. Perhaps we also have an idea of part of the material used in the exterior construction. We are asked to be exact about the shape of the door, porch, roof, chimneys, and windows; whether the windows are plane or circular, whether they have cornices, or whether the trimmings around them are of the same material as the rest of the house. A friend, who will be unable to see the house, wishes to know definitely about the angles of the roof and the way the windows are arranged with reference to them. Unless we can answer these questions exactly, we merely tantalize our friends by telling them we have seen the house. To see an object merely as an undiscriminated mass of something in a certain place, is to do no more than a donkey accomplishes as he trots along.

Agassiz's Method. — Agassiz's pupils usually had excellently trained perceptive faculties as one result of his teaching. Since his pupils generally succeeded well in life,

it will be profitable to notice how he trained them. A certain student who wished to be well grounded in zoölogy presented himself at the professor's laboratory one morning. The professor immediately pulled a fish out of its jar of alcohol, and said: "You are to look at this fish carefully and tell me when I return how much you have seen. You must not cut it nor use any instruments upon it."

The professor then left the student alone with the specimen. The student had seen fish before. He knew that they were oblong objects with fins and scales, but he looked at that special fish for ten long minutes. He was then sure that he had seen all that was visible from the outside, and he started to tell the professor so. The museum was carefully searched, but the thoughtless instructor had left the building. There was nothing for the disgusted student to do but to return to stare at the uninteresting fish. Feeling that his time was too valuable to be wasted in this way, he nevertheless looked at the fish for a half hour without seeing anything. Then he turned the fish over. He looked it in the face; he gazed at it from above, below, behind. Two hours passed and he was inexpressibly disgusted. He knew that it was a fish; but he was sure of that before he came to the great Agassiz.

The student then put the fish in the jar and went to lunch. When he returned he found that the professor had been there and gone away somewhere to remain for several hours. It seemed strange that such a man should be wanted for a teacher. Again the disgusted student stared at the fish. This was growing tiresome, and, to amuse himself, he began to count the scales. Feeling that this was nonsense, a happy thought struck him, and he proceeded to draw the fish. He had just made the interesting dis-

covery that the fish had no eyelids, when Agassiz returned and remarked that a pencil was the best of eyes. He asked the student to tell what he had seen and looked disappointed at the shortness of the recital. "You have not looked very carefully, keep on looking," said Agassiz, who then left the room.

The student then went to work with a will, and, with his pencil, he began to make discoveries, and to wonder how it was possible for him to see so little at first. For three long days he was made to gaze at the fish. Agassiz would occasionally return to listen to a recital of new discoveries, but would answer no questions. In after years the student said: "This was the best zöological lesson I ever had,—a lesson whose influence has extended to the details of every subsequent study; a legacy the professor has left to me, as he left it to many others, of inestimable value, which we could not buy, with which we cannot part."

If Agassiz had been an inferior teacher, he might have been afraid of being charged with wasting his pupils' time, and he might have answered questions which the pupils should have asked of their own senses alone.

A grasshopper is to most persons merely an oblong insect, capable of jumping. Agassiz's pupils say that after he had compelled them to find out a world of interesting matter about it, they would sometimes go to hear him deliver a popular lecture. They noticed that the audience became as much interested in the grasshopper as if he were reading from a romance.

The Best Studies for the Cultivation of Perception.— Any study is good which compels the student to learn facts from his own senses. One study of this class is per-

haps as good as another. Botany is excellent, if one goes out into the fields and studies actual flowers; but it is a very poor study if one gathers the facts mainly from a text-book. All of the natural sciences afford unusual opportunity for using the senses. Among these sciences may be mentioned physics, geology, ornithology, entomology, botany. They all require the most searching use of the perceptive faculties. In connection with them, drawing should be taught. If any one wishes to find out how imperfectly he has perceived anything, let him undertake to draw it. In order to draw well, one must perceive well.

In general, the scenes amid which we move every day furnish excellent object lessons for our perceptive faculties. Every time we enter a street car we see different types of people, and there is a great deal to be noticed about each type. Every human countenance shows its past history to the one who knows how to look. Whenever we take a walk, there is vastly more to see than we have time to inspect. No one can complain that the most ordinary life does not furnish sufficient materials with which to cultivate perception. In the most remote backwoods there are always the clouds, the flowers, the birds, the trees, the animals, the stars. Mother Earth tries to entertain us by shifting the scenery from day to day and from season to season. The only trouble is we will not look. Having eyes we do not see, and having ears we do not hear. The scenery of the heavens is more magnificent on a clear night than anything that was ever put on an artificial stage. A good pair of eyes are required to trace out the different constellations and to recognize them in their constantly shifting positions. When one is familiar with the myths which the brightest race that ever lived has woven about

these constellations, he can look at the heavens as he would at the pages of a grand romance. Things fit for the enjoyment and instruction of a prince are every day lost to the poor observer.

Methods for Cultivating Rapidity of Perception. — Life is short and there are many things to see. Existence yields the most to him whose mental faculties work the quickest. Thirty years measure a longer life span for some than seventy for others. Some persons will take in more at one glance than others do from torpidly staring around for half an hour.

Criminals have some excellent methods for training the young. An instructor in the department of thievery will place on the palm of his hand a number of objects, say a coin, a chestnut, a button, a key, and a bean. He will unclasp his hand for a second before a number of boys, who are expected not only to name all the objects, but to describe them. For instance, the value of the coin must be given and the shape of the key accurately described or drawn on paper or in the dirt. Then the instructor will, perhaps, substitute a hazelnut for the chestnut and a pea for the bean, but woe be to the boy who does not instantaneously detect the difference. These boys are sent out for the feigned purpose of begging. They catch a glimpse of the parlor, the hall, the kitchen, or the office, and in that one glance they note the position and value of everything. They then report to the men who sent them out and a burglary is planned. It is a pity that such excellent methods of teaching rapidity of perception are, for the most part, left to criminals.

Successful gamblers often become so expert in noticing the slightest change of an opponent's facial expression

that they will estimate the strength of his hand by the involuntary signs which appear in the face and which are frequently checked the instant they appear.

There are many excellent methods for cultivating rapidity of perception, and they can be employed with but little trouble. At the start, place upon a small table seven different articles. Remove for an instant the cloth used to cover them, and then have some one describe the articles. This can be played as a game, and prizes can be offered to the one naming the most things. Only one should be allowed to approach the table at once, and the cloth should be raised for the same length of time for each one. To avoid disputes, each one should at once write down in another room, or in a different part of the same room, the name of every article seen. The number of things on the table should be gradually increased to forty.

Houdin's method of walking rapidly by a shop window, and then writing down as many as possible of the articles displayed, is a good exercise. If different things are at the same time tossed into the air and allowed to fall behind a screen, or into a basket, bag, or sheet gathered up, great quickness of perception will be necessary to name and describe all. A word may be written on a revolving blackboard, which is then to be turned with a rapidity barely sufficient to allow the word to be made out at the first trial. New words or sentences should then be added. With practice a sensible statement of several lines can be read at one glance. The late President Porter, of Yale, was credited with being able to read at a glance a quarter of a page of an ordinary sized book.

It must be remembered that things which are rapidly done are not for that reason the worse done. The fingers may be almost invisible in their rapid flight over the piano,

and yet a better tune may be played than if they were placed slowly, one by one, on the proper keys. A wide-awake eagle would probably see more of a thing at one glance than would a drowsy lizard in a quarter of an hour. Extreme rapidity of perception, due to careful training, was one of the factors enabling Houdin and his son to astonish everybody and to amass a fortune. He placed a domino before the boy, and instead of allowing him to count the spots, required him to give the sum total at once. This exercise was continued until each could give instantaneously the sum of the spots on a dozen dominoes. The sum was given just as accurately as if five minutes had been consumed in adding.

Houdin, after recounting these methods and their results, and saying that these feats are often surpassed by persons in ordinary life, writes: "Thus, for instance, I can safely assert that a lady seeing another pass at full speed in a carriage will have had time to analyze her toilette from her bonnet to her shoes, and be able to describe not only the fashion and quality of the stuffs, but also say if the lace be real or only machine made. I have known ladies to do this."

This age of the world wants persons who can do things not only well but quickly. Those who cannot combine both qualities will be pushed to the rear in the struggle for existence.

CHAPTER V.

REPRESENTATION.

MEMORY.

Relation of Memory to Perception. — If things left no mental impress after they were present to our senses, we should not be as wise at threescore and ten as we now are at five. On seeing an object a second (or third) time we could not recognize it, or know that our home was our home, or that a red-hot iron was red hot. After the mind has perceived things, it has the power of representing them again to itself, or of remembering them, as we say in everyday language. It is a function of mind to remember, just as capillary action is a function of cinchona and maple trees, or as the bearing of apples is a function of apple trees. All these functions are, of course, mysteries at bottom.

Following the lead of physicists who have shown that heat, light, and electricity are all due to vibrations in the same ether, and who are striving to show that all the metals and the elements are, in the last analysis, one and the same substance, the tendency of modern psychologists is to look upon memory, perception, thought, emotion, imagination, and will as one and the same thing. But an important consideration is overlooked. It is probably true that almost all the phenomena cognizable by the senses are due to vibrations, but it is not true that vibrations

of the same intensity will produce all these different phenomena. Heat comes to consciousness as something different from sound. Perception, memory, etc., are functions of the same mind, but of the same mind acting in different ways.

In spite of all that metaphysicians may say to the contrary, a man would not be considered sane if he had lost the power of distinguishing between objects of sense and of memory, nor would his testimony be considered valid in a court of law. And yet the activity of a brain cell due to the perception of an object, and the innervation of the same cell caused by mental effort in recalling the object, are much more alike than is commonly supposed. This truth will be emphasized later. At the same time popular common sense is true when it declares that memories of a feast dispel no pains of hunger, and that the memories of a red-hot iron are not so painful as the original sensation.

The Objects of Memory. — Memory is a conscious revival of any kind of past mental experience. We may recall not only any object that has been present to any of the senses, but also any former mental experience, such as thinking, feeling, willing. We frequently hear some one say, "I shall never forget how I felt when that happened."

All sense objects are not recalled with equal ease. The majority of persons have the keenest memories for objects of sight. Sounds are less easily recalled ; while touches, tastes, and odors seldom give many clear-cut memories. There are, however, many persons who, like Beethoven, can remember sounds more distinctly than anything else. There are said to have been gourmands whose mental imagery consisted of tastes of partridge, terrapin, jellies, sauces, etc. When the dog dreams, it is evident from his

quivering nostrils that his memory images are chiefly due to smell.

The greatest poets have had extremely good memories for past emotional states. When an idea of an object that had caused them an emotion at any past time was recalled, there were also recalled their feelings at that time. In middle age, Shakespeare could remember his feelings during boyhood. This power was one of the factors in his greatness. Most persons have indifferent memories for past feelings. Persons are often heard to say: "When I get well, I shall never forget how I felt when I was sick. I shall hereafter be far more attentive and considerate to the sick." In the majority of instances, on recovery, the memories of these feelings soon grow dim. Mentally, man is as yet an imperfectly evolved creature. It is conceivable that the man of the future may make fuller use of all his powers and be as superior to his present self as the locomotive is to the stagecoach.

Physical Basis of Memory. — After a new sensation, it is probable that the cortex of the brain never returns to its exact former state. There is a certain change in some brain cell, and this change furnishes the physical basis for conscious memory. The number of cells in the human brain has been estimated at from 600,000,000 to 2,000,000,000. The wisest person that ever lived probably had several million brain cells that were more or less idle.

Repeated sensations from the same object modify the brain cells more effectively. The changed molecular arrangement tends to become permanent. One sensation, if of sufficient interest or intensity, may impress itself ineffaceably upon the brain; but in the majority of cases

repeated impressions are necessary. The brain seems to work very much as the fingers do in playing the piano. They need much practice to become pliable; if the practice is intermitted, their pliability diminishes. If the brain cells are not brought into frequent action, they also lose their cunning, and we forget. We learn a language so as to speak it fairly well; then we do not use it for five years. If at the end of that time we attempt to converse in it, we shall notice how "rusty" we have become. Five years' absence from a piano will diminish the capacity of the fingers for playing. It is well to know that the same law applies to brain exercise as to the exercise of other parts of the body.

Again, the brain, like the muscles, is the most pliable in youth. The brain cannot take on new modifications in advanced life, just as an old pair of hands cannot learn how to play the piano well. Millions of facts should be stowed away in the youthful brain. There is not a moment to spare while the brain is still plastic. When the blacksmith has his iron nearly white-hot, he strikes quickly and fashions it as he chooses. If he were to sit down and wait until it cooled before striking, it would no longer be pliable under his hands. Persons who do not work hard with their youthful brains are like this mistaken blacksmith.

An intelligent old professor was told a fact which made a certain theory of his impossible. His lecture a week later showed that he still taught the old theory. His brain cells could not take on the modification demanded by the new fact. The brain paths were too deeply marked for his ideas to escape their grooves.

How matter lodges in a youthful brain is shown in the classical case of the German servant girl. When she was

very young, she heard a clergyman read aloud passages from Hebrew, Greek, and Latin authors. Of course she understood nothing that was read. Years after, when she was delirious, she repeated many of the passages with literal exactness. Her youthful brain had retained impressions which had no intellectual meaning to her. Just as a cut or bruise modifies the skin and may leave a lifelong scar, so do sensations modify the brain. Were it not modified by them, there would be no reason why the nerves of the ear and the eye should end in the brain and register their sensations in it. When the temporal lobes of the brain are diseased, the memory for spoken words is impaired. This shows that the activity of the brain cells is as necessary in the process of recalling something as in the original perception.

The theory of the physical basis of memory has not been generally taught, because it was thought that this theory would lead to materialism. Should the theory prove to be true, it was supposed that the soul could not be immortal. It was asked: If the mind can call up ideas only with the aid of the brain, what can the mind do when the decay of death has settled upon the brain? But if a theory is true, it will do no good to reject it for fear of the consequences. If, on a certain occasion, we very much dislike to have two and two make four, it will do no good to insist that the sum is only three. But the alarm is needless in this case. One person can talk to another in a distant city only by means of a telephone wire. If the wire is broken, the speaker can no longer make the other hear; but it does not therefore follow that the speaker has ceased to exist. The brain may play a part analogous to the telephone wire. It has never been shown that consciousness cannot have as much of an existence apart from

the brain as a speaker can apart from a telephone. All that has been shown is that consciousness can manifest itself to mortals only by means of physical mechanism.

Memory a Special Case of Imaginative Representation. — The mind has the peculiar power of forming images, which in so-called literal memory are symbols of the object represented. Thus, I form an image of an ellipsoidal yellow object, and this image serves my mind as a symbol of a lemon, when the fruit is not present to my senses. The chapter on imagination will show that there are no absolute lines of demarcation between images of so-called memory and of the imaginative power. Both are products of this latter power. A discussion of the likeness and difference in these products had better be reserved until we consider the imagination. We may here define memory images as products of the imaginative power, which serve as symbols of actually existing things previously experienced. We may further say that these image symbols differ in the fidelity wherewith they represent such objects. Memory images are those which most nearly represent existing things. We shall consider other images in the chapter on imagination. In psychology the term "image" is no more applicable to products derived from the eye than to those of the other senses. It is as proper to speak of auditory as of visual images.

Two Theories of Memory Images. — It has often been asked: Where are the images of memory when they are not present to consciousness? We see a man one day, but do not think of him again for a month. We can then call up a distinct image of him. Where was the image of the man during the month?

The first theory is that the full-fledged idea is in the mind, but slumbering beneath the stream of consciousness; just as a person is alive when sound asleep, without being aware of the fact. When we are not conscious of an idea, it is believed to disappear just as a diver does beneath the surface of the water; and the one is held to keep its form as intact as the other during this disappearance. This theory further holds that the images of memory are totally unlike those of perception.

The second theory starts by saying that an idea is the mind at work. An idea has no existence out of a conscious mind. Brain cells exist with structures modified because of certain sensations, and when consciousness uses these cells, ideas spring up. To ask, therefore, where the memory image is, would be analogous to asking: Where are the movements in the fingers of a trained piano player while he is asleep? The movements are nowhere, but there are a modification and a capacity in the fingers, enabling them to repeat, or reproduce, those movements. A represented memory idea is the mind at work in the same way in which it has worked before. If we are asked how it is possible for the mind to fashion so strange an immaterial symbol as a conscious idea to represent something, we can no more answer than we can tell why one vine should bear watermelons and another pumpkins, or why either vine should bear anything.

This theory makes it clear that, if an idea is simply mental action, a certain idea can exist only when the mind is working in a certain way. Other ideas exist when the mind works in different ways. A good mind remembers how to work in many different ways. If a piece of cloth had the power both of folding and of unfolding itself, it would more easily fold itself again in the places where it

was before folded. It is so with memory. The mind has a natural tendency to work again in the same way in which it has worked before, and the process of so doing is memory. It will do us no harm to return to the phraseology of everyday life and to speak of recalling ideas or even objects, if we understand what is really meant thereby. We may, if we wish, speak metaphorically of an idea as the fruit of the mind, in the same sense that an apple is the fruit of the tree. Both represent the results of energy.

There is unquestionably a difference between our idea of an object, say a lion, when we stand looking at it, and when we shut our eyes and picture it. The most timid sane woman would not be in much more danger of mistaking the memory image of a lion for the perception of the actual animal, than of thinking that electricity was light. The connection between the image of perception and of memory is just about as close as the bond between electricity and light. Quicken the light-producing vibrations in the ether, and they cause electricity. Intensify the action in a memory cell, and the resulting idea may be confounded with a perception. It is of course conceivable that the "lion memory cell" might be thrown into such intense action as to cause the woman to think that she saw an actual lion. Analogous cases have happened; but were they the rule and not the exception with any person, she would be considered neither normal nor sane. We may say that an idea from direct perception of an object differs from the represented idea of memory chiefly in intensity. If a memory brain cell is thrown into sufficiently intense action, the mental product may be mistaken for a perception.

The phenomena of hypnotism are partially due to the fact that brain cells are thrown into such intense action by

suggestions of the operator, that the subject thinks he has actual perceptions. Many persons have at some time or other thrown so much energy into an idea of performing a certain action, that they have actually believed that they had done it. A man of unquestionable integrity testified that he locked a certain door. Two equally upright persons took their oath that they saw him leave the room in a great hurry without stopping to lock the door. He had thrown such energy into his determination to lock the door, — as much as he would have expended in the act, — that when he came to think the matter over, he was sure he could remember locking the door.

There are few who cannot recall analogous cases in their own lives. A man intends to wind his watch. Something interrupts, and in the morning he is astonished to find that the watch has run down. We purpose to put a certain thing back in its place. Something else claims our attention, and we are surprised to find, on returning, that the thing is still out of its place. Sometimes we insist that we did replace the article, but that some disorderly person has pulled it out in our absence.

Having said enough in this section to guard the student against thinking that he can, in every case, distinguish between an image of memory and of perception, we may close with this general rule: The presence of an actual object gives great vigor to a brain cell; the normal internal revival gives far less.

Powers Involved in Remembering. — In order to remember anything, the mind must have the power (1) of retention, (2) of reproduction, (3) of recognition, and (4) of referring an object to a certain more or less definite place and time. If the mind could not retain a disposition

to act again in the same way as before, or, in more popular language, if the mind could not retain an idea, knowledge would be lost as soon as the object ceased to be before the mind; we might as well put gold coins into a pocket containing holes. The brain cells, of course, furnish the phenomena of the physical side of retention.

There must also be reproduction. We frequently put things away in a garret or elsewhere, spend more time hunting for them than they are worth, then finally rush out and buy a new article. It is of no use to have a thing, unless it can be produced when we want it. Hence we see that retention is not enough, for any attic may retain things so well that we cannot find them.

But even retention and reproduction are not sufficient. We may retain an idea of the features of a man and reproduce it, but if we do not recognize it, we should not be able to identify the man the next time we saw him. We must first be able to recognize him as a man that we have seen before. Recognition is knowing that we have had the same idea before.

The spatial and the temporal elements in memory are less definite, but an idea always has some relations to space and time. We saw a certain man in New York last summer, or icicles hanging from the eaves in the winter.

Different Kinds of Memory. — Many persons think that memory is mainly due to sight; but we have as many different kinds of memory as we have senses. To sight, the watermelon is a long greenish body, but this is its least important quality. Sight alone gives the poorest idea of the watermelon. We approach the vine where the fruit is growing, and, in order to decide whether it is ripe, we tap the rind and judge by the sound. We must

remember that a ripe watermelon has a certain resonance. By passing our hands over the melon, we learn that it has certain touch characteristics. We cut it open and learn the qualities of taste and smell. All this knowledge afforded by the different senses must enter into a perfected memory image.

The physical basis for these different memories is to be found in different brain tracts. Again, our memory of the written word "watermelon" is different from that of the spoken word. Our memory for controlling the vocal cords in uttering the word is different from the memory for directing the fingers in writing the word. Hence we see that many complex processes go to form an idea of a thing. Napoleon was not content with only hearing a name. He wrote it down, and having satisfied his eye memory as well as his ear memory, he threw the paper away.

Association of Ideas.

The Sequence of Ideas Governed by Law. — Sometimes we fancy that ideas floating through our minds are under the control of no law; but the truth is that our ideas appear under the direction of a law as inflexible as that which controls the ocean currents or the rising and falling of the tides. All ideas have certain definite associations with other ideas and they come up in groups. There is always an association between our ideas, although there are cases when we cannot trace it.

The writer was once surprised, in a distant city, to find a picture of the Yale campus appear in his mind. He was thinking about a subject which had no conceivable connection with that campus. The mystery was solved when he realized that he was hearing a certain tune whistled,

which had before been strongly associated with the college grounds.

Even in cases where we find no association between our ideas, we may be sure that it exists. Uneducated people realize this, for, when a person makes some remark, they wonder how he came to think of that, and they often rightly conclude that such a thought would never have occurred to him unless he had been in possession of some information which suggested it. An idea, then, never appears in consciousness unless there is a definite reason why this idea should appear in preference to others.

Since the labyrinthine character of nerve fibers connecting different brain tracts has been better understood, we feel less surprise at our inability to retrace in consciousness the associative path between some ideas. We know that the current may pass so easily along certain fibers connecting different cells, that the connection will not be sufficiently intrusive to rouse consciousness. Two apparently disconnected ideas will then appear in the mind.

Necessity for a Physical Basis of Association. — Excitement of the auditory nerves goes to the temporal lobes; of the optic nerves, to the occipital lobes. We have seen that in order to obtain a percept of a peach, we must weave together the sensations given by the various senses. Since these report to various parts of the brain, there must be connection between all, or they could not be fused into one idea. These connections we may term associative fibers. A peach is not a peach until we have associated the gustatory, visual, tactile, and olfactory sensations. Our knowledge of a bell would be very incomplete were the sound not associated with the sight.

Suppose we endeavor to recall our memories of a water-

melon. In Figure 20, let V stand for a visual sensation in the brain; A, for an auditory sensation; M, for the muscular sensation in uttering the word "watermelon"; O, for the sensation of odor; *t*, for that of taste; T, for the indefinitely localized sensation of touch. These sensations have affected different parts of the brain, and they must be associated with each other before we can

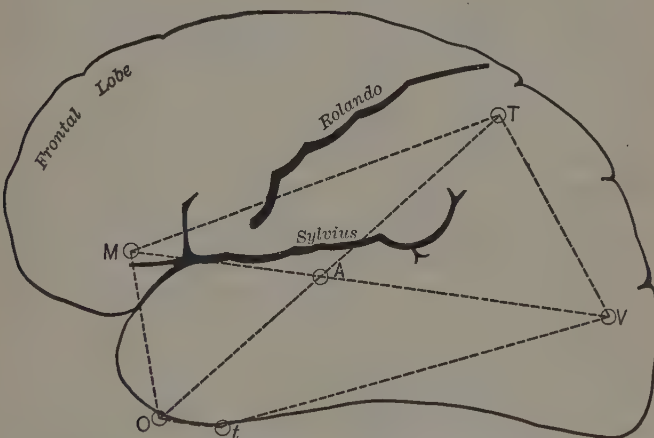

FIG. 20.— Diagram showing different brain tracts acted on by the various sensory stimuli.

remember a watermelon in its completeness. The factors thus associated are the visual appearance, the resonance of the watermelon when we snap our fingers on its rind, the muscular sensations in calling the word, the odor and the taste, and the sensation from touch. Besides these, we may have a temperature memory of the coolness of the melon, a muscular memory of the sensation resulting from lifting the fruit, another muscular memory of the sensations involved in writing the word. Nerve fibers more

complex than those indicated by the dotted lines in the diagram connect the different parts of the brain.

The physical basis of cerebral association is, therefore, to be found in the cells and connective fibers of the brain.

Primary Law of Association.

Contiguity in Consciousness. — Ideas or objects that have been before consciousness at the same time, and hence apperceived in the same mental state, tend afterwards to suggest each other.

(1) This law does not mean that the objects must be contiguous in external space and time. They may be thousands of miles distant and separated by an interval of many years. The essential thing is that the mind grasps the ideas together. If Napoleon and Alexander the Great once come before consciousness at the same time, they will afterwards have a tendency to be associated. If they are never a part of the same mental state, that is, if they never come into the mind together, they can never be mentally associated, though memories of both may exist.

(2) Contiguous association includes both *coexistence* and *succession*. The ideas may not only be in the mind at the same time, but they may follow each other to almost any extent, as is shown in the case of those who have memorized all of Milton's *Paradise Lost*, complete plays of Shakespeare, or the successive steps in a geometrical demonstration. It does not matter how long the web of knowledge is, provided the mental loom weaves the product firmly together.

When ideas are in the mind at the same time, like a house and its color, the visual aspect of a person and the sound of his voice, they are said to coexist. When ideas

follow each other, like the letters of the alphabet or the words in a poem, they furnish examples of succession.

(3) No similarity can ever be detected between any two objects, unless they are before the mind at the same time. This being so, the law of contiguity comes before any law of similarity. If we have an image of only one human countenance before the mind at a given time, we can discover no resemblance between that countenance and nothing at all. After we once have two countenances in contiguous relations before consciousness, we may then, and only then, proceed to note the similarity, which, as will be shown later, furnishes a powerful secondary law for close association. But similarity is not a primary principle of association, because ideas must first be examined in contiguous association before any similarity can be noted. When we come to consider the law of association by brain contiguity, this statement will seem still clearer.

(4) The law of contiguity itself involves relations. Contiguity means a relation in time and space; and to children, as well as to many older people, the relation of cause and effect. The effect frequently follows the cause in quick contiguous association. Lightning and thunder, a blow and pain, cold and ice, spring and blossoms, green apples and indigestion, a cut from a knife and the appearance of blood, are firmly linked because of relations of contiguity.

(5) The law of contiguity does not imply that we pay equal attention to all objects before us at the same time. The parts of a landscape are all connected, but we link together certain elements that interest us, and neglect others. The human mind is not a machine, like a camera, which must photograph impartially everything within range.

We may, in the landscape, single out for contiguous attention the line of graceful willows, the winding brook, the white house and the hillside, and may neglect the other elements. The mind, while working under the law of contiguity, is, at the same time, using its apperceptive power and singling out for attention interesting objects which can be assimilated to other ideas. If several objects are contiguously present to perception, the mind will always quickly dismiss the least interesting, those which cannot be assimilated or apperceived in terms of present ideas. To repeat, one idea cannot be assimilated to another, or apperceived in terms of another, unless both ideas are contiguously associated in consciousness. Suppose we are looking toward three objects, — a panther, a cat, and a wooden pail. We shall very probably not see the pail; but we shall not apperceive the panther as a big cat, unless the mind first gets ideas of both animals before it at the same time, or, in other words, in contiguous association. No resemblance can be discovered between the panther and nothing whatever.

Illustrations of the Law of Contiguity. — The alphabet affords the simplest illustration of this law. *A* has been associated with *b*, and *b* with *c*. We naturally say *a*, *b*, *c*; it would be an effort to say *a*, *m*, *h*, because *m* has not been associated with *a*, nor *h* with *m*. We rattle off all the logically disconnected letters of the alphabet so easily, because they have been before the mind in contiguous association. In this way we associate the Fourth of July with fireworks, Thanksgiving with turkeys, Christmas with Santa Claus. If we were memorizing Gray's *Elegy*, we should rely on this law to recall the words in order.

"The curfew tolls the knell of parting day."

Here "curfew" succeeds "the"; "tolls" succeeds "curfew," etc. We learn the words in this order, and hence when we start the line, the remaining words tend to follow. Were it not for this law, words might be interposed from a poem learned at some other time. Thus, we might say, "The curfew tolls, my country, 'tis of thee, once upon a midnight dreary, strike till the last armed foe, all blessings flow." As the case is, no matter if we know the *Elegy*, *America*, *The Raven*, *Bozzaris*, and *Doxology*, the law of contiguity keeps us from mingling them. There are adults who dislike jelly because it was associated in their youthful days with medicine. We may once see a person in questionable company, and find that our minds thereafter associate him with that company. The law of contiguity is as far-reaching and as diverse in its operation as are our paths through life.

Law of Cerebral Contiguity. — Whenever any brain cells have had connected action, the action of any one tends to set the others in action. In learning the alphabet, a certain part of the brain cortex was in connected action. When, at some future time, the cerebral cell in which *a* was registered vibrates so as to affect consciousness, those vibrations or excitations tend to spread and to set in action the cells where *b* and *c* are registered.

Two similar sensations are registered in a contiguous brain tract, not because they occur at the same time, but because they are similar. We have already seen that sensations of hearing modify a different brain tract from sensations of sight. It is further probable that two exactly similar sight sensations would excite precisely the same ganglion cells in the occipital lobes. A sensation would excite a certain brain cell in preference to another,

only because this sensation was similar to a former one which had modified that same cell. The same brain cells may be repositories for similar qualities of different objects. Whenever a quality of a new object knocks at the door of a brain cell, which has stored up a modification corresponding to the same quality in a related object, we may expect that cell to bring to consciousness a memory of the former object.

When a man sees an imposing mass of thunder clouds and immediately thinks of a distant mountain range, it is probable that the sensation from the clouds affects the same brain cells as did the sensation from the mountains. This was the case only because there was an undoubted similarity between the irregular white tops of the clouds and of the mountains. When the clouds were seen, the mountains were thought of only because the similar sensations affected the same brain cells or contiguous ones. The almost certain truth that similar sensations, like birds of a feather, flock together in the brain, may some day become a psychological proverb.

Sometimes two objects dissimilar in every respect save one are associated, because the similar sensation coming from this one like quality is sufficiently strong to set in action the entire brain cell retaining the modification from the first perceived object. We have already commented on this in considering illusions. The photograph of a stranger recalling a friend, though only the noses are alike, would illustrate this tendency. In these cases, the objects come into the mind before it has noticed their similarity. Only after they are in consciousness together are they known as similar. But the brain brought them up together because their effects upon it were similar in some respect. These sensations are unconscious of their

similarity to each other. The relation of similarity is the product of a conscious mind at work upon ideas already brought to it by contiguous association.

Reasons for Many Obscure Associations. — We must not expect to be able to trace out a conscious connection between all our ideas, because the association is frequently the result of complex connecting nerve processes which may effect the connection so smoothly as not to arouse consciousness. Ideas that follow each other automatically illustrate this tendency. Removing the waistcoat at night is often preceded by winding the watch, although there may be no *conscious* connection between the ideas leading to such movements. There may be unconscious preparatory action in the brain tract tending toward a conscious result, and nothing but this result may appear in consciousness. We may thus explain those dreams in which some apparently forgotten memory has recurred, furnishing the desired knowledge. The dream set in action a portion of the brain. The excitement spread and roused some dormant cell.

Secondary Laws of Association.

Difference between Primary and Secondary Laws. — A primary law states the general rules that ideas obey in coming to the mind. All ideas are associated on a contiguous principle. A secondary law shows why one, rather than another, of contiguously associated ideas comes to the mind at a given time. Out of fifteen ideas associated by contiguity, why does the seventh now come to the mind in preference to the fourth? To account for this, we must find some reasons, which we term secondary laws.

These are more interesting than the primary law of

contiguity, since they cause variety in our mental life. If our memories were as mechanical as the movement of a belt around a wheel, they would always come and go in the same order. If we chalk the letters B. M. P. X. on the outside of a band, then revolve the wheel, we may be sure that they will return in that invariable order. The mere statement of the law of contiguity would lead us to expect that ideas would return in the same fixed way, that they would be subject to as little variation as the letters on the belt or the tunes of an organ grinder.

Principal Secondary Laws. — There are many reasons why one of a number of ideas, associated with a certain other idea by contiguity, should come to the mind rather than another. The most important reasons are these: —

I. If there are fifteen ideas associated by contiguity, and if a *likeness* has been discovered between the fourth and the seventh, they will be the most apt, other things being equal, to come together to the mind. We may call this the *law of correlation.*

II. If the fourth and the seventh of those ideas have been often *repeated*, that repetition will give them special vigor to fight their way to the front in the struggle for conscious representation and association. This may be termed the *law of repetition.*

III. The fourth and the seventh ideas will be more apt to recur together if their relation appeals to the *emotional* side of our nature, — if they are more interesting because they are recent and vivid, because they agree with our natural preferences, or because they stand in a pleasing or displeasing relation to other interesting ideas. This may be called the *law of emotional preference.*

IV. If the attention has been strongly centered by an act of the will on the fourth and the seventh ideas, they will thereby be given additional vigor in the struggle for association. This is the *law of voluntary attention.*

Law of Correlation. — Whenever any thought relation is discovered between some of our ideas, those thus related will be more apt to suggest each other.

Let us look at these three words together: *annual, stone, annus.* If we know that *annus* is the Latin for year, and discover the similarity between that and *annual,* we should in the future be much more likely to associate the first with the third than with the second, although all would fall under the law of contiguity, having been in the mind together. When the word *annual* is mentioned, the word *stone,* because of lack of similarity, would be normally surpassed by the word *annus* in associational competition.

If Julius Cæsar was the object of conversation, Napoleon, Marlborough, Cromwell, and Wellington would naturally come to mind in preference to many another great man. War and generalship would furnish a logical bond for uniting them, no matter in what different circumstances of time and place these men lived. When a man, with a mind that has been trained to unite things by their relations, sits down to write an article or to prepare a speech, illustrative examples from all sources occur to him. Those who have not linked things together by the law of correlation, wonder how he can think of so many pertinent illustrations.

Some have insisted that a law of contrast is necessary, because things seem to be preferred in recall on account of their very difference. Such a law is unnecessary, for

such objects will be found to have more or less of the same quality, and this is sufficient to furnish the associating link. A dwarf may suggest a giant by this so-called law of contrast; but the giant and the dwarf really differ in respect to the same qualities, height and size. The giant is taller and larger than the dwarf. A bad man may suggest a good man, because they differ in respect to the quality of goodness.

One of the great beauties of a trained human mind is that it recalls things preferably by thought relations, and it is not enslaved by the accidents of time and place. An ignorant person on the witness stand will insist on telling everything, no matter whether it bears on the case or not. His memory is almost entirely contiguous. If, between two given events, he bought a barrel of flour on trust at a red grocery, one of his children was teething, or he blew his nose, he must relate the events in the order in which they occurred. Having never learned to think logically, he really has no other way of getting from the one event to the other, except by using everything that happened as a stepping stone wherewith to cross the intervening stream. Deny to him the right of using a certain stone, and he stands puzzled in mid-stream.

Mrs. Radcliffe, in *The Romance of the Forest*, illustrates this point well. One of her characters rushes into the room with very important news, which his master is eager to hear:—

"O, sir, I've heard something that has astonished me, as well it may," cried Peter, "and so it will you, when you come to know it. As I was standing in the blacksmith's shop, while the smith was driving a nail into the horse's shoe; by the by, the horse lost it in an odd way. I'll tell you, sir, how it was."

"Nay, prithee, leave it till another time, and go on with your story."

"Why, then, sir, as I was standing in the blacksmith's shop, comes in a man with a pipe in his mouth, and a large pouch of tobacco in his hand."

"Well — what has the pipe to do with the story?"

"Nay, sir, you put me out; I can't go on, unless you let me tell it in my own way. As I was saying — with a pipe," etc.

Law of Repetition. — Whenever mental acts are often repeated, their corresponding brain cells are made stable and vigorous, by the same law that gives strength to muscles when they are exercised. An arm kept in a sling becomes weak and flabby. The same is true of brain cells that are not given their proper exercise. A pair of strong arms can far surpass weak ones in elbowing their way through a crowd; so can a strong brain cell more easily affect consciousness. If, out of a hundred ideas, the thirty-fifth has been repeated more often than the others, the brain process corresponding to it will knock loudest at the door of consciousness. If we hear of widespread injury to a distant city, we think first of its people and buildings that we have seen most often, for they have left the deepest mental impress. In traveling through a foreign country, anything related to our oft repeated business attracts our attention first.

Law of Emotional Preference. — By a law of the emotions, we are in the majority of cases more interested in something that has recently happened than in distant events. In cases where this is true, an idea due to recent experience will win in the fight with an idea of the opposite kind. If Constantinople is suddenly mentioned, and if I have been recently reading about its numberless dogs, my association of ideas would be more apt to turn in their direction than toward the Sultan. On the other hand, if

I have listened to a recent talk about the religion of that city, I should probably think of the mosques and of the muezzins' call to prayer.

Vividness of experience is a potent factor in recollection. What is extremely vivid necessarily interests us more than what is ordinary, and hence comes under the emotional law. A person who had just left the shelter of a tree, when it was torn in pieces by lightning, says, that whenever it begins to thunder, an image of that tree comes distinctly before him. There have been thousands of other objects associated in his experience with thunder storms, but he always thinks of that particular experience because of its vividness. Certain brain cells are probably more affected by one such experience than by fifty repetitions of uninteresting events. The experiences of childhood often throng the memory of old age because they were so vivid. They deeply affected the plastic brain cells. An old man will often recall events of fifty years ago more easily than those of the day before. The child is also far more interested in each new experience than are old men, for it constitutes his entire world for the time being, and he is constantly expecting new discoveries.

Interest is an extremely strong factor in determining the current of association. If a broker, merchant, and antiquarian were asked to write down the idea first suggested by the word *stocks*, the broker would be apt to mention some railroad stocks in which he was interested, the merchant would think of purchases for his fall or spring trade, and there would occur to the antiquarian some historic example of the use of stocks for punishing criminals. Whenever a certain man thought of a distant state, he immediately wondered whether its legislature had passed a bill for the

extension of a railroad through a large tract of land owned by him. He sold the land and soon ceased to think of the doings of the legislature. If the state is now mentioned, he thinks of a pleasant summer passed with a friend residing there. If an interesting and an uninteresting idea fight for the privilege of appearing in consciousness, the interesting one will win. More scientifically speaking, if two brain processes struggle for the mastery, the one accompanied by an interesting mental state will win. The same law governs the ideas for which there is hereditary preference. Water is more interesting than land to a duck at birth. If the duck dreams, its aquatic experiences will sway the dream current most strongly. Men with a hereditary preference for art certainly think and dream most often of objects connected with art.

The change in our emotional states has much to do with changing the direction of our associations. An idea, A, is often followed by S one day and by L the next. Why, as we pass a certain farm on Monday, do we think of a pear tree behind the house, while on Tuesday the association of ideas goes straight from the house to the well beyond it? The answer shows the power of emotional bias to sway the current of association. On Monday we were hungry, and that feeling ushered in the idea of the pear tree, the moment we caught sight of the place. The next day we were thirsty, and immediately thought of the well. Examples like these emphasize the truth that what interests us to-day may not do so to-morrow.

Law of Voluntary Attention. — The greater the mental energy thrown into attending to anything, the better fitted will be the idea of that thing to recur to consciousness and to give new direction to the stream of association. This

truth is perhaps nowhere better shown than in reading literature. It is possible to read authors like Shakespeare, Milton, Chaucer, and De Quincey, and to throw so little energy into the reading, that but very few ideas from them will be found struggling with much vigor on the battle-field of association. In order to win in this struggle, an idea must have vigor. Will power used in centering the attention can give vigor to any idea, even though it is uninteresting. Such a one is more than a master for a whole regiment of ideas that are products of weak attention and relaxed will. Those ideas that recur most frequently are the ones that determine what our lives shall be. If trivial ideas hold the field of association most often, our lives will be insignificant. If by an act of will power we center our attention upon nobler things, vigorous ideas will arise from them, and our lives will take a nobler course. If, in one sense, we are slaves of association, in another, we are its masters, for we may determine upon what ideas we shall center our attention, and consequently what ideas shall be allowed to grow strong.

The physical study of attention shows that it causes more blood to be sent to any parts involved in attention, no matter whether these are in the limbs, trunk, or brain. Hence, attention to any special thing must give additional activity to those cells whose function it is to be modified by sensations from that thing. With slight cause they will be again thrown into action at some future time, and the idea of the thing will come distinctly into memory. The action of brain cells that have not been thus modified may be too weak to affect consciousness, and hence the stream of association will not be changed by them. The centering of our attention here or there has much to do with brain modification.

Dreams.

Explanation of Dreams.—It must be borne in mind that dreams are to be explained by the laws of association. The current of ideas in a dream and in waking hours flows on obedient to the same laws. Hence, we are not required to lay down a single new principle. If a person gets the covering off his feet on a cold night, he may dream of walking barefoot on ice; or if he has recently been reading of polar travels, his dream may take him through strange experiences in those regions. When the covering slipped off a bottle of hot water at the feet of a sleeper, he dreamed that he was walking on the crater of Mt. Ætna. The crust was so hot and thin that it threatened to break and plunge him into the seething mass below. Another man, under similar circumstances, dreamed that Italian brigands were holding his feet in the fire to make him disclose his treasure. He had been reading of such an instance a short time before. A slumbering fire suddenly darted into a bright blaze, and caused a sleeper to dream that the gates of heaven had been thrown wide open. He seemed to enter, and his dream current was swayed by all the celestial pictures that had ever been before his mind. *The Revelation* had greatly impressed him when a boy, hence his dream naturally took this direction. No one ever invents entirely new ideas in a dream. Before the discovery of America, no European ever dreamed of an Indian. After this, slight pains in the head often started dreams of Indians with their scalping knives.

A chief reason why dreams are so fantastic and out of all keeping with the actual conditions of life is because the association of ideas has no guiding purpose and is like a runaway horse. Riding after such an animal is different

from ordinary riding; for the horse, unrestrained by the rein, is liable to go almost anywhere. In our waking hours we generally have a more or less definite purpose in view, and we keep our ideas in the middle of the road leading to our destination. If other ideas force themselves in for a short time, we generally drive them away and keep on in the straight road of our predetermined business or pleasure; or, if we start off on a new path, we follow that straight for awhile. In dreams there is no concentration of attention upon any one definite line. Ideas related in any strange fashion may come trooping in, and any one of these may call up any other fantastically related idea. At the same time there are often remarkable exhibitions of the constructive imagination in dreams. This is due to unconscious cerebral processes.

Power of the Association of Ideas.

Ideas are Colored by Associated Ideas. — An eminent philosopher has said that man is completely at the mercy of the association of his ideas. Every new object is seen in the light of its associated ideas. A man was once relating a very amusing story, as he thought, of a fishing party. While the rest of the company were laughing, a woman suddenly burst into tears. The idea associated in her mind with fishing excursions was the death of her son by drowning. A poet was one day admiring the graceful curves of the waves and experiencing a soothing sensation from their sound, when he heard a fishwife exclaim, as she looked at a white-capped wave, "How I hates to see thee show thy white teeth." To her the sea was a monster that had devoured her loved ones.

The principle of the association of ideas is sufficient to

account for the change in fashions. A woman in a southern city had a bonnet that she particularly admired, until she one day saw three negresses wearing precisely the same pattern. She never appeared again in that bonnet. When a style of dress becomes "common," and is worn by the lower classes, it is discarded by the fashionable people. Fashions that are absolutely repulsive will often be adopted if they are introduced by popular or noted people. From his excesses, Henry VIII. became a bloated figure in the latter part of his life, and the aristocracy stuffed their clothing to imitate his size. Queen Elizabeth had auburn hair, and the ladies of fashion sought for a dye that would turn their hair to the aristocratic shade.

A knowledge of the power of the association of ideas is of the utmost importance in business. One man has his store so planned that all its associations are pleasing, from the manners of the clerks to the fixtures and drapery. Another store brings up unpleasant associations. A business man was about to employ a young man for an important position, when one day the elder chanced to catch sight of him in questionable company. The law of contiguity henceforth brought up this company whenever the young man was thought of, and he failed to secure the position.

When negligee hats first made their appearance, a shrewd hatter sent for a very popular and well-dressed collegian and offered him his choice of the best hats in the store, if he would wear a negligee hat for three days. He objected to making such an exhibition of himself, until he was flattered by the hatter's wager that the hats could, in this way, be made the fashion for the entire town. When the collegian first put in his appearance on the campus with the hat, he was guyed for its oddity. Late in

the afternoon, some of his friends concluded that the hat looked so well that they would invest. On the following day large numbers reached the same conclusion. For some time after this the hatter found difficulty in keeping a sufficient supply in stock. Had an unpopular or poorly dressed man appeared first on the campus with that hat, the result would have been the reverse. The hat would have been the same, but the association of ideas would have differed.

Some of the ladies of fashion in a large European city selected on their own responsibility, without consulting the milliners, a cheap spring Manilla hat, which was very handsome. The milliners found themselves with a high-priced stock for which there was no demand. They held a council, bought a large number of the cheap hats, and put them on the heads of all the female street sweepers and scavengers in the town. When the ladies of fashion went out the next day, they were amazed to see the very dregs of the city arrayed in head gear like their own. It was not long before the result was what might have been expected.

Few people stop to think how powerful with every one is the association of ideas. Few would have any objection to dancing merrily on a plain rosewood board. Let that same board be cut up and put together in the form of a coffin, and no one with memories of a dead friend or relative would manifest merriment in its presence. The same rosewood board would be there, but not the same association of ideas. While visiting the New Orleans Exposition, a woman asked a friend to call her attention to any embroidery that he saw. His attention happened to be drawn to a white casket in the undertakers' exhibit. On the lid of this casket were some of the most

exquisitely embroidered flowers. Knowing her fondness for them, he called her. She came eagerly; but when she saw them on the lid of a coffin, she fairly ran away.

It is not the business of the psychologist to state what power the association of ideas *ought* to have. It is for him to ascertain what power it *does* have. When we think of the bigotry of past ages, of the stake for the martyr and the stoning of witches, we can realize the force of Professor Ziehen's statement: "We cannot think as we *will*, but we *must* think as just those associations which happen to be present prescribe." While this is not literally true, it may serve to emphasize a deflecting factor which is usually underestimated.

CHAPTER VI.

THE CULTIVATION OF THE MEMORY.

Physiological Side. — We have learned that when a certain part of the brain is diseased or destroyed, our memory for a certain class of sensations is affected. We know that memory involves a physical change in the brain. For lasting memory, perception must cause a permanent change in the brain cells. Since physiological psychology has demonstrated this, it has been possible to proceed more intelligently in cultivating the memory.

Beyond question, some men have at birth marvelously impressible brains. That men should differ in brain power is no stranger than that they should differ in muscular power. Without training, John L. Sullivan could have overpowered several ordinary men at one time. He was naturally endowed with unusually strong muscles.

We may grant all these physiological facts and native differences, and yet insist on the great importance of memory culture. If the muscles of an arm are naturally weak and flabby, there is all the more reason for exercising it. Even a Sullivan improves his strong arms by exercise. Had he kept one in a sling, that arm would soon have become weak. To keep either muscle or brain tissue from becoming weak, we must obey certain laws.

An eminent physiological psychologist says of the memories common to most of us: "During the first five minutes

after their deposition, the images of memory lose very little or nothing at all of their intensity and distinctness. Then the slow process of material change begins, gradually effacing the material dispositions. To express it in the language of psychology, the images of memory gradually lose their intensity and distinctness. The more seldom they are reproduced, the more rapidly does this change progress" (1). "If we *often* see a certain man, the latent material trace of this complex of sensations is more deeply imprinted on the elements of the cerebral cortex than when we see him but rarely. We can recall the idea of this man more easily and more vividly, if we have seen him often. . . . We must regard this material trace, which we designated conditionally as a latent image of memory, to be in reality a definite spatial arrangement and a definite constitution of the molecules. Originally, this arrangement is very unstable; not until after the same sensation has been very frequently experienced does the molecular arrangement which it creates and leaves become stable. Only after the ganglion cell has acquired in this manner a very definite and fixed disposition of its molecules can a *vivid* idea be awakened from this disposition by association. At the same time the idea is more easily awakened by association, the more fixed the arrangement of molecules. . . . Finally, we can draw one more simple conclusion with reference to the latent images of memory. If these are in fact only material dispositions, the material change in the ganglion cell will not be without influence upon this molecular disposition. In other words, if new and more or less similar sensations do not again renew this disposition, in the course of time it will imperceptibly lose its stability and be finally obliterated. The simplest introspection agrees with this

statement. This loosening and final destruction of the latent mental images is nothing more than what we call forgetfulness; we forget ideas that are not constantly and repeatedly reëxcited by similar or like sensations" (2).

On the physical side, it must be said that whatever affects the general health will affect the memory. Indigestion, headache, weariness, bad air, — all affect the brain. A man with a naturally fine memory was taken sick, and, on recovering, he suffered for nearly a year from feeble heart action. A sufficient quantity of pure blood did not reach his brain. During this time he often complained that he could remember scarcely anything. When the heart action again became normal, his memory regained its former vigor. The first rule for securing a better memory is to pay attention to the laws of hygiene, to endeavor by all means to keep the health at high-water mark.

The Formation of a Clear-cut Image. — Haziness of perception lies at the root of many a bad memory. If perception is definite, the first step has been taken toward insuring a good memory. If the first impression is vivid, its effect upon the brain cells is more lasting. All persons ought to practice their visualizing power. This will react on perception and make it more definite. Visualizing will also form a brain habit of remembering things pictorially, and hence more exactly.

Sir Francis Galton states that while visualizing is a faculty hereditary with some people, it is yet capable of being acquired. He instances the case of a noted French teacher, who trained his pupils so that after three or four months' practice, the students "had no difficulty in summoning images at will, in holding them steady, and in

drawing them." Every walk affords materials for training this faculty. Let any one see if he can vividly image some fine-looking house, tree, flower, or landscape. In studying botany, it is not rare for a pupil to be able to recall the image of an absent flower, with all peculiarities of shape and attachment of petals, and to point out the exact difference between it and a present flower. Persons who can visualize in this way are at a great advantage, when some deceitful tradesman tries to make them think that a certain article is the same as one they have bought before, or even superior to it. They merely summon the image and compare it with the present article.

From his extensive study of this faculty, Sir Francis Galton is entitled to speak with unusual authority. He says: "The free action of a vivid visualizing faculty is of much importance in connection with the higher processes of generalized thought. . . . A visual image is the most perfect form of mental representation wherever the shape, position, and relations of objects in space are concerned. . . . The best workmen are those who visualize the whole of what they propose to do before they take a tool in their hands. . . . Strategists, artists of all denominations, physicists who contrive new experiments, and, in short, all who do not follow routine, have need of it. The pleasure its use can afford is immense. I have many correspondents who say that the delight of recalling beautiful scenery and great works of art is the highest that they know; they carry whole picture galleries in their minds. Our bookish and wordy education tends to repress this valuable gift of nature. A faculty that is of importance in all technical and artistic occupations, that gives accuracy to our perceptions, and justice to our generalizations, is starved by lazy disuse, instead of being cultivated judi-

ciously in such a way as will, on the whole, bring the best return. I believe that a serious study of the best means of developing and utilizing this faculty, without prejudice to the practice of abstract thought in symbols, is one of the many pressing desiderata in the yet unformed science of education" (3).

Application of the Primary Law of Association in the Cultivation of Memory.

Law of Contiguity.—The facility with which we remember things will depend largely upon the way in which we associate them. An intelligent use of the law of contiguity will aid the memory. Suppose we were to wish to remember when Sophocles, Plato, Alexander the Great, Socrates, Aristotle, Philip of Macedon, Euripides, Demosthenes, and Herodotus lived. If we tried to remember them as so many isolated individuals, we should have hard work. It is unnecessary for us to select more than one date to be learned outright,—470 B.C., the birth of Socrates. He was the instructor of Plato; Plato, of Aristotle; Aristotle, of Alexander the Great. Philip of Macedon was the father of Alexander. Against Philip, Demosthenes delivered his noted orations, called Philippics. Between 500 and 470 B.C. were born Sophocles, Euripides, Herodotus, and Thucydides, hence all were contemporaries of Socrates. The birth of Euripides and the battles of Thermopylæ and Salamis occurred in the same year, 480 B.C., while the battle of Platæa was fought the year after.

By ingenious use of the law of contiguity we string these men and events together like beads. A pull on the string brings them all into view. Were they learned as isolated facts, there would be no associative power to aid

recall. The law would be ready enough to help us, but we would not invoke its aid.

A student of English history can make the date 1666 bring up a large number of facts. The great fire which destroyed the larger part of London occurred in this year. This fire was the cause of the formation of the first fire insurance company in London. In that year tea was first brought from China into England. The year 1666 saw the following famous persons living, — we notice that six of them are named John: John Milton, John Bunyan, John Dryden, John Locke, John Evelyn, John Churchill, Samuel Butler, Samuel Pepys, Samuel Richardson, Sir Thomas Browne, Thomas Hobbes, Sir Isaac Newton, Robert Herrick, Richard Baxter, Jeremy Taylor, William Wycherly, William Temple, William Penn, Daniel Defoe, Izaak Walton, and Robert Boyle, the father of chemistry.

The year before, that is, 1665, saw the Great Plague, when London was so depopulated that grass grew in its streets. In this year Milton finished his *Paradise Lost.* The year before, in 1664, New Amsterdam was taken by the Duke of York, from whom it was called New York.

The best way to study history or literature is to select some noted man or epoch and group as much as possible around this central idea. For example, take the Elizabethan period and group around it the men and events of note of that period, not only in England but also in Europe. Ideas thus grouped will often come in a procession before the mind, and hence they will be kept fresh by reviewing. John Stuart Blackie gives this wise advice: "Read as much as possible systematically and chronologically. Without order things will not hang together in the mind, and the most natural and instructive order is the order of genesis and growth."

Use of the Secondary Laws of Association in the Cultivation of Memory.

Law of Correlation. — Whenever we can discover any relation between facts, it is far easier to remember them. The intelligent law of memory may be summed up in these words: Endeavor to link by some thought relation each new mental acquisition to an old one. Bind new facts to other facts by relations of similarity, cause and effect, whole and part, or by any logical relation, and we shall find that when an idea occurs to us, a host of related ideas will immediately flow into the mind. If we wish to prepare a speech or write an article on any subject, pertinent illustrations will suggest themselves. The person whose memory is merely contiguous will wonder how we think of them.

Almost any study, if approached in the right way, will afford material for cultivating the correlative memory. In all history we shall find constantly recurring elements. There is so much similarity that the more we read and compare the histories of various nations, the fewer absolutely new things do we find with which we must burden our memories.

No matter what subject we are studying, it will be well to bear in mind Professor Blackie's advice: "Nothing helps the mind so much as order and classification. Classes are always few, individuals many; to know the class well is to know what is most essential in the character of the individual, and what burdens the memory least to retain."

Though the brain is in its most plastic state before the age of fifteen, and in that state the brain certainly can most quickly and most easily amass a vast number of

isolated facts, yet, if we know English and Latin, we can at the age of twenty learn French more easily than we could learn it as our first new language at twelve. The reason for this is that our correlative memories improve with age. In learning a new language, there are so many points of likeness to the old, that each succeeding new language becomes easier and easier because there are so few really new roots in it to be learned outright. By way of illustration, from the English *night* and the Latin *noctis*, may easily be remembered the Greek *nuktos*, the Sanskrit *Nakta*, the German *Nacht*, the Anglo-Saxon *niht*, and the French *nuit*.

The mere act of comparing one thing with others serves to concentrate attention upon it, and thus to secure definite cerebral effects. The nearest approach to a royal road to memory is by comparison. But a difficulty frequently presents itself in correlative association because there may be no apparent likeness between two objects. If we take a list of objects among which we can easily discern a relation, it will cause us little trouble to remember them in order. With one careful reading we can recall in order vapor, clouds, rain, spring, brook, lake, river, ocean, waves, icebergs, ships, sailors, rigging, sails, wind, rocks, wrecks, lifeboats, life-saving stations. We must be careful to detain vapor and clouds in the mind for a moment and notice the relation between them; then we must compare clouds and rain; then, rain and spring, taking care to have only *two* objects in the mind at one time, and only those two which are to be immediately associated. If we have the first and the third in the mind together, the first will have a tendency to suggest the third and not the second.

Unfortunately all objects are not so easily associated. There are many between which the slightest relation does

not appear at first sight; but we must remember that everything in this world is either directly associated with other things, or it is related to a third object which in turn is related to these other things. It may be hard work to associate *spike* directly with *pirate*, but we can easily associate a spike with the planks of a ship and the ship with a pirate. The principle by which we associate things will differ according to our education and experience. Some would supply the associating links in this way: spike (steel, metal, gold, thief) pirate. A chemist might say spike (iron filings, ink, black flag) pirate; a clergyman, spike (crucifixion, pieces of silver, ill-gotten gains) pirate. If we were asked to associate *eagle* with *shoe*, we might think of aerial locomotion, then of terrestrial locomotion, then of shoe; or, eagle (wing, foot) shoe. If a person had read how an eagle attacked a young calf, he would say: eagle (calf, calfskin) shoe. A classical scholar might make this combination: eagle (Mercury's winged sandals, foot) shoe.

Suppose we were required to retain, in order, the following ideas: barrel, moon, horse, gold, ocean, star, watermelon, humming bird, trunk, salt, pig, mausoleum, coal, balloon, ice, picnic, Mr. Gladstone, Iceland, lamp, tooth, *Paradise Lost*. The skeleton outline of a speech, suggesting the different heads and illustrations, is frequently as difficult to remember as these. Unless an associative principle is found, one object will not be apt to suggest another. We shall now proceed to give one of the many ways by which the above-mentioned list of objects may be combined, putting in parentheses the objects used solely for connecting links:—

Barrel, (circular head) moon, (moonlight rides) horse, (power) gold, (precious objects, pearl oysters) ocean, (the

compass of Phœnician sailors) star, (night, thief) watermelon, (sweet fruit, honey) humming bird, (swiftly moving object, express train) trunk, (journey, Dead Sea) salt, (salted meat) pig, (slaughter house, death) mausoleum, (funeral, cremation) coal, (gas) balloon, (altitude) ice, (ice cream) picnic, (grove, felling trees) Mr. Gladstone, (England, island) Iceland, (long nights) lamp, (oil, fat meat) tooth, (toothache, pain) *Paradise Lost.*

In order to have facts adhere firmly in the mind, they must be thought over, and their relations to knowledge already acquired must be understood. All this takes time; hence the majority will never have the patience to cultivate their memories. No memory scheme that claims to produce startling results in a few lessons is of much value. Any one might as well claim to make, in a few days, an athlete out of a weak person. It takes time to train the muscular system to its highest development; and then it requires constant training to keep the muscles strong. Keep an arm in a sling for a month, and the arm will be weak. Neglect the proper training and use of the memory for some time, and the memory will become less vigorous. Constant work is the price of success in anything.

Since time is required to note what points of attachment a new fact has to an old, we can understand why it does little good to rush over a subject in a short time in preparing for an examination, or to see how quickly one can get over a book. The results for a few hours may seem brilliant, but the mind has not had time to classify the new facts or to note in what relation they stand to knowledge already acquired. Unrelated facts, unless frequently reviewed, will soon be forgotten, and all the time spent in acquiring them will prove wasted. An eminent English lawyer said that the associates of his youth frequently read

as much law in a day as he in a week, but at the end of twelve months his knowledge was as fresh as at first, while theirs had been forgotten. He took the time to weave his knowledge together into a finished fabric.

Unrelated Facts. — While we recognize the truth that the majority of facts can be united by thought relations, we must remember that life also requires us to learn many arbitrary symbols. The statement that the only improvement in memory consists in an improvement in thinking is perhaps more than three quarters true. But the statement does not convey the whole truth, and is for that very reason misleading. There are many things that have to be learned outright. No amount of reasoning will give 1066 as the date of the Norman Conquest, or 1455 to 1485 as the duration of the Wars of the Roses.

It is unfortunate that so much of our lives has to be spent in learning arbitrary symbols; but such is the fact. Language, as we actually learn it, is largely arbitrary. No person can give a valid reason why the term "oak" should not have been applicable to a hickory tree, or "larch" to a pine tree, or why the rose should not have been called by some other name. The student of physiological psychology learns that the motor center for speech is in the third frontal convolution, while the sensory center lies on the other side of the Sylvian fissure in the upper temporo-sphenoidal convolution, and the sight center is in the occipital lobes, although he cannot understand why these localizations should not have been different. The anatomist has to remember outright the attachment of hundreds of muscles, and the fanciful names given many of the bodily organs. In short, in everyday life, one has to retain many things by sheer force of memory, unassisted

by reason. No one, in the first place, ever learned how to conjugate the English, Greek, or German verb "to be" by force of reason.

The remaining secondary laws of association will be found especially helpful in enabling us to learn arbitrary facts, as well as related ones.

Law of Repetition. — We have learned that there is a struggle on the part of mental images to survive. Life is an arena where the weakest go to the wall. Vigorous and well-grounded images will monopolize the field of consciousness and of course exclude the weaker ones. The secondary laws of association show us what gives an image strength, what enables it to survive.

Since we have learned that memory is dependent on a physical disposition of brain cells, repetition has held a high place in memory culture. In order to achieve permanent results in growing and changeable matter, the cause must be persistently active. When we speak of repetition as an aid to memory, we do not necessarily mean *blind* repetition. The steps in a reasoning process can be repeated as well as a series of incoherent ideas. Therefore, repetition is as much of an aid to intelligent as to unintelligent memory. Few persons realize how great an aid it is in both cases.

It is a stupendous task to learn even our own language so as to speak it readily, but constant repetition fixes word after word so firmly in the mind, that we can recall thousands with no danger of forgetting. The reason why it is desirable to go to a foreign country to learn its language is because repetition works there with full force. We are constantly hearing the same words and phrases. We are compelled to talk the language ourselves, and to keep

constantly using the vocabulary we have acquired. When we leave the country and neglect to use the language for a long time, we find that so many words have slipped away that we are perplexed to carry on continued conversation. And yet a moderate amount of repetition after our return will enable us to keep our memory of the language fresh. It is a difficult task to learn twenty-six meaningless symbols in exact order, yet repetition has enabled us all to remember the letters of the alphabet in order. We never even fear making a mistake as we hasten over them.

Because of the natural law that everything tends to weaken by disuse, muscle and mind alike, we should all endeavor to enter into some pursuit or study that will force us to make constant use of the knowledge we already have. The fact that writing does this in an eminent degree has led Alexander Bain to remark that "a course of book reading without attempts at original composition is as faulty an extreme as to begin and carry on writing upon a stinted basis of reading." A class or a literary club is fitted to draw forth whatever knowledge one possesses and to keep it fresh by constant use. Perhaps the most valuable auxiliary to the memory is conversation. If we talk over with some sympathetic friend what we have read, we refresh our knowledge, and impress our own minds doubly; for the conversational way of putting things demands that we first have lucid ideas and then express them in the clearest manner.

A patient German, Professor Ebbinghaus, experimented with his memory for over two years, and he learned many important facts about remembering and forgetting. He could recall in order with one reading seven meaningless words. In order to recall twelve such words, sixteen readings were necessary; to recall twenty-four words,

forty-four readings were required. After an interval of one hour more than one half of the words had been forgotten. In eight hours two thirds had slipped from memory. From that time on the rate of forgetting was slower, and at the end of a month one fifth was remembered.

These experiments afford some practical truths (1) We must expect to forget soon the greater part of what we have learned, unless we have an occasional thorough review, or unless the knowledge is such that we have to make constant use of it. (2) Thoroughness at the time of learning will aid very much in subsequent recall; but the German professor found that no amount of repetition at the time of the original memorizing would make him sure of remembering for all future time. The work must be reviewed after an interval of time. The fact that an iron has been well polished once does not render it certain that it will never again rust. A young physician thought that he could turn his attention entirely away from medicine toward something else and still retain his medical knowledge. After he had followed this course for six years, he declared that he felt almost as incompetent to treat a case of diphtheria, which presented itself to him, as if he had never studied medicine. Much disappointment will be avoided in any walk of life, if we do not expect to remember those facts which we do not frequently review.

Law of Emotional Preference. — There is nothing easier than for one to recollect what greatly interests him. If interest can be brought to the aid of memory, the battle is partially won. Boys, who could apparently remember nothing in the way of study, have gone to a baseball game and been able to recall every one of the complex moves. The power of interest furnishes the reason why the mem-

ory of the creditor is proverbially excellent. There was a certain man who had two kinds of memory, so his enemies said,—one for his own affairs, which was excellent; another for the affairs of others, which was execrable.

One way, therefore, in which to render a mental acquisition permanent is to become interested in it. If the subject is something for which we have not naturally a particle of interest, it is still possible to acquire an indirect interest. We may consider how the acquisition will some day be advantageous, how it will bring us either fame, friends, or money. When we look at things from the point of view of their results, it is far easier to become interested. The writer once knew a man who dreaded learning isolated facts or arbitrary symbols, yet he quickly mastered stenography because he knew it would be the means of his gaining a livelihood. Interest works with double leverage, first rendering acquisition easy and pleasant and then making memory sure.

If we were to take a careful inventory of all remembered facts, we should find that the vast majority were those in which we felt an interest. Other facts naturally slide out of the memory by default of repetition.

Law of Voluntary Attention. — Those ideas are most apt to be recalled upon which we have by an act of the will centered our attention. Joseph Cook well says: "Attention is the mother of memory, and interest is the mother of attention. To secure memory, secure both her mother and grandmother."

Many persons read mechanically or automatically; they are perfectly passive; they never summon their will power to aid them in ferreting out the thought. There are many who pass through life without ever concentrating all their

mental energy upon a single page. Just as a sunglass can focus the solar rays until a fire is kindled, so the will can concentrate the intellectual energies upon a subject until it is fused and absorbed by the mind. That mechanical or involuntary attention which the majority give to their reading, or to their so-called study, explains why so many so soon forget what they have read. The memories of such people are apt to grow poorer and poorer; it becomes increasingly harder for them to break up their habits of inattention, and so lasting memory is lost to them.

On the other hand, when the habit of concentrating the attention has once been formed, it requires less and less effort to keep the mind firmly fixed on a subject. Persons traveling through an interesting country may let the scenery be imaged on the retina, without directing any energetic attention toward certain features. If asked at the journey's end to describe the country, they are unable to do so. A copyist, having transcribed a long article, was asked to give as much as possible of its contents, the article having been lost. Though he had copied every word, he did not retain a single thought, for the reason that he had not fastened his attention upon the thought. One reason why drawing is such an excellent aid to memory is because such severe drafts are made upon the attention.

Many persons sigh over a weak memory, never thinking that the trouble is rather in the will. One of the saddest things in life is to see the vast amount of misapplied and unused mental energy. Every person ought occasionally to talk to himself in this way: "I am sure that I can remember a thing if I am determined to do so. The trouble has hitherto lain in my will, not in my memory. My will has been a milk-and-water kind of an affair, worthy of a jellyfish, not of a human being. I have

been impatient to master a given subject quickly and I have determined that if I could not fly to a given place, I would scorn to walk slowly to it. I hate trouble and hard work, and that is the reason why I do not improve. I realize that persons with half my intellect, but double my will, are surpassing me every day. Shall the tortoise continue to beat the hare in life's race? He will if he keeps plodding right along, turning neither to the right nor left."

Mind Wandering.

Practical Remedies for Mind Wandering. — A sure cure for mind wandering is to make an abstract from memory of sermons, speeches, or books. If one is reading a work on history, let him, after finishing a page, close the book and repeat to himself the substance of that page. If he cannot do so with one reading, let him reread until he can. It does not show good generalship to march into a hostile country leaving forts and armies unconquered in the rear. After finishing a chapter, let him repeat to himself, or to some friend, the substance of that chapter. At the end of the book, let him repeat the main facts in the entire work. The mind may wander at first, and scarcely anything may be retained from one reading; but as soon as the mind feels that it will be surely called upon to reproduce what has been read, its energy will be doubled. It will soon cease the lazy habit of merely allowing impressions to come in to meet it; it will reach out to meet the impressions.

The writer knows of a case of mind wandering cured by the oral recital and the making of a written abstract of the substance of three books, an English history, John Stuart Mill's *Political Economy*, and a text-book on psychology.

The chapters were in every case reread until a full abstract of each could be written down from memory.

Value of Psychic Laws in Memory Culture.

Psychic Laws not to be Evaded.— The student ought not to be disappointed to find that memory is no exception to the rule of improvement by proper methodical and long-continued exercise. There is no royal road, no short cut, to the improvement of either mind or muscle. But the student who follows the rules which psychology has laid down may know that he is walking in the shortest path, and not wandering aimlessly about. Using these rules, he will advance much faster than those without chart, compass, or pilot. He will find mnemonics of extremely limited use. Improvement comes by orderly steps. Methods that dazzle at first sight never give solid results. After a careful study of all the principal memory methods, the writer has endeavored to give all the rules that will be found of practical service. These rules are merely practical applications of the inexorable psychological laws stated in the foregoing pages.

AUTHORITIES QUOTED.

1. Ziehen's *Introduction to Physiological Psychology*, p. 220.
2. Ziehen, *Ibid.*, pp. 170–1.
3. Galton's *Inquiries into Human Faculty*, pp. 109, 113–4.

CHAPTER VII.

THE IMAGINATION AND ITS CULTURE.

Imagination.

Definition. — Imagination is the power of representing a mental product as an image. Whenever any idea is embodied in an image, the result is the work of imagination. Both memory and imagination are merely the representative power at work. As we shall see presently, there is no absolute line of demarcation between its products. Things which have once been presented are presented again by the imagination, in a more or less new way.

A completed image of an individual thing is a complex product, woven from the raw material of several sensations. As before stated, the term "image" in psychology, is as applicable to a represented sensation of the ear as to one of the eye. There are auditory, tactile, olfactory, gustatory, and optical images.

Imagination in Perception. — We have already seen that sensation furnishes raw materials for perception to interpret. Imagination always aids in this process. If we look at an apple before us, we construct an image of the opposite side, which we cannot see. Otherwise we could never have an idea of an entire apple, a pitcher, a house, or anything of which we could not see all parts at once. When we are directly in front of a person, we do not conclude that his head ends with the part of his face that

we see. We represent to ourselves the back of his head. Let any one suppose that the face of some actual person is all there is to the head, that the back part either does not exist or has been sawed off, and then notice the difference in the idea of that person's head. We perceive only the outside of a watermelon, but that means little to us unless we picture the ruddy interior with its rows of seeds.

Two Uses of the Term Imagination. — I. In one sense imagination is the power of so-called literal reproduction of an actually existing thing, under the semblance of an image. This is precisely what we mean by an image of memory. If we close our eyes and image an apple as faithfully as possible, we use imagination in this sense of the term.

II. There are images to which there is nothing exactly corresponding in the external world. We illustrate in a marked way the power of the imagination to construct such images, when we form ideas of a mermaid, Pegasus, a winged angel, or a bridge before it is built.

No Absolute Line of Demarcation between These Two Classes of Images. — Recent psychology has triumphantly bridged over the gap between the so-called literal and the constructive image, as Professor Wundt clearly shows, when he says: "Psychologists are accustomed to define memory images as ideas which exactly reproduce some previous perception, and fancy images as ideas consisting of a combination of elements taken from a whole number of perceptions. Now memory images in the sense of this definition simply do not exist. . . . Try, for instance, to draw from memory some landscape picture which you have only once seen, and then compare your copy with

the original. You will expect to find plenty of mistakes and omissions; but you will also invariably find that you have put a great deal in which was not in the original, but which comes from landscape pictures which you have seen somewhere else. . . . There is no memory image that reproduces either the primary perception image, or any other memory image of that same perception."

We may, therefore, state as a law the fact that images never exactly reproduce the original object. They are subject to constant change from loss of certain elements, from the addition of elements belonging to different experiences, and from changes in retentive brain tracts.

Popular common sense nevertheless insists that there is a difference in images with respect to reality. After we remember the conditions given above, we may rightly admit that some images are more like reality than others. We may give an approximately accurate statement of the difference between the two classes of images as follows: Images differ in the exactness wherewith they represent real things. Some images are much more nearly literal copies of existing things, are more easily recognized as representations of things that have actually been perceived. The image of a Pegasus, unlike that of an ordinary horse, could not be referred to an object seen before. The element of *recognition* is therefore less prominent in the second type of imagination.

Dissociation. — As association is the first step in simply remembering things, so dissociation is the process preliminary to imagination of the second type. All concrete images are formed in the first place by associating certain elements. There is also the power of dissociating them, preparatory to combining them in different ways By

referring to Fig. 20, page 113, we see that sensations from one object through the various senses pour into different parts of the brain. Hence imagination has some naturally dissociated material, with which to begin.

Experience is dissociative as well as associative. The child pulls his toys to pieces and dismembers his dolls. If Irving had no nursery experience that prompted the introduction of the Headless Hessian into *The Legend of Sleepy Hollow*, soldiers who were contemporary with Irving had had such experiences. Man tears things to pieces every day. He sees the trees bare in winter, then covered with vernal foliage and laden with autumnal fruit. He views the trees now standing, now cut down, now transformed into a beam, a board, a desk, a car. He sees the wool on the back of the sheep reappear in the most varied forms of clothing. The traveler to regions south of the equator finds cold dissociated from December and associated with June, and whiteness dissociated from swans. In winter we see fluidity dissociated from water, and, if the cold is sufficiently intense, from the metal mercury also.

Preliminary dissociation is the antecedent step to imaginative construction. If an architect wishes to build a new structure out of the materials of an old house, he must first pull it down and separate them, so as to have them ready for recombination. If things come with one invariable associate, it is hard work to imagine them unconnected with that. The King of Siam had always associated fluidity with water, and he could not possibly imagine how its surface could ever become hard enough for his elephants to walk on. In the time of Columbus, the imagination could not picture, on the opposite side of the globe, men with feet toward ours. Children, and all who

have had little experience with the outside world, have narrow imaginations, partly for the reason that they have found so many things with one invariable association. Giants and fairies are easily pictured by children, because human beings of various size are seen every day. A man at a considerable distance would appear no larger than a fairy or a pigmy. One of the easiest exercises of the imagination is to vary things in size, because magnitude changes not only with individuals but with distance.

Different Imaginative Products. — I. The imagination can construct an *approximately literal image* of some existing object. We may form an image of a tree with a view to drawing it as exactly as possible.

II. The imagination has the power of *separating* parts of concrete objects. We may imagine a human head floating through space, separated from the body. The Bible tells us of a hand that wrote upon the wall. We may form images of a tree without branches, or of a branch separated from the tree. In short, we may image anything, from the claws of an eagle to the nose of a swine, separated from the usual concomitants.

III. The imagination may form a *simple combination* of separated elements. The Grecian joined the head and trunk of a man to the body of a horse, and thereby gave us the mythical Centaur. To the body of a goat, the imagination added the head of a lion and the tail of a dragon, thus forming the classical Chimæra. To the body of a dog, the imagination added three heads, and put snakes in place of hair, thus fashioning Cerberus, the guardian dog of Hades. The Harpies had the head of a beautiful maiden, the body of a vulture, and the claws of an eagle. The mediæval Satan was constructed by adding to the

human form the horns of a goat, the hoofs and tail of an ox, and the wings of a bat. Mercury's sandals were propelled by the wings of a bird. Our caricaturists place the head of a politician on the body of a dog, a monkey, or a serpent.

IV. The imagination has the power of representing any actually existing object as *diminished* in size. Dean Swift made use of this power in writing the voyage to Lilliput in *Gulliver's Travels.* The Lilliputians needed ladders to climb upon the body of Gulliver, when he was lying down, although he was a man of ordinary size. The Grecian imagination has given us a vivid account of the pigmies fighting with cranes. The fairies, with an acorn for a car or a mushroom for a throne, are examples of the use of this power, as are also the dwarfs with whom the mediæval imagination peopled every hill and mine.

V. The imagination can *enlarge*, to an indefinite extent, images of actual objects. Thus, we have the giant Atlas carrying the heavens upon his shoulders, the Hundred-handed Giants, and the Cyclops whose single eye was larger than a saucer. In the voyage to Brobdingnag, Swift tells us of men seventy-two feet in height. In that country Gulliver's head could be taken into an infant's mouth. The Norse imagination made the Midgard Serpent so large that it encircled the earth.

VI. The imagination has the power of *selecting* from the elements of images of past experience, of *altering* these selected parts according to a rational plan, and of *constructing* a new image from these changed elements. The productions of the great musical composers, poets, artists, and inventors illustrate this constructive power. Nature gives us no object like a watch, a steam engine, a typewriter, or a typesetting machine. The mind has no

more important power at its disposal than the *constructive imagination.*

Difference between the Mechanical and the Constructive Imagination. — Considering imagination as the power of forming an image which does not represent with approximate exactness any existing thing, we must distinguish between that process which merely joins unchanged parts of different objects and that which makes a change before uniting them. If half a woman is joined to half a fish, thus forming a mermaid; if the head of a donkey is placed by a comic artist on the shoulders of a man, — we have examples of the *mechanical* imagination. If a shapeless lump of iron is fashioned into a sewing machine or a locomotive, — the image must precede the material fashioning, — we have imagination in the *constructive* sense.

The mechanical imagination, which joins images in any order, is seen in dreams; incongruous images make their appearance, subject to no plan. The lighter creations of fancy often show the predominance of a passive mechanical element, although construction is sometimes at work in a marked degree in both dreams and fancy.

The Constructive Imagination. — The mechanical imagination joins dissociated parts without altering them. Such products are as inferior to those of the constructive imagination as is a pile of brick to a finished house.

I. The constructive imagination is always characterized by a *definite purpose*, which is never lost sight of until the image is complete. A child starts to build a house out of blocks. These are often changed and taken down many times, before the form in which they are built is such as

to fit the growing, purposive image in the child's mind. Before an architect builds a house, he must form successive images, which he alters whenever they conflict with the general plan of that special dwelling. An inventor often spends years in changing and recombining the images of parts of his machine, but he is all the while dominated by a definite purpose. The images must be altered until matter poured into their mold fulfills the aim of the inventor.

II. The constructive imagination is *selective*. Images which do not suit a given purpose are rejected. But few of the many images summoned by the poet or inventor are chosen. A child could not reach a coveted article on the mantel in a sleeping room. Imagination began to work, and soon a chair was pushed up to the mantel; but the chair was not sufficiently high for the article to be reached. Again the imagination worked. The child glanced at a second chair with the evident intention of putting that on the first, but the result, though only imaged in this case, did not appear to please him. When this image was dismissed, another was selected. On the bed was lying a comforter, the shape of which did not fit the chair. The child soon formed images of that comforter folded into the right size to go between the arms of the chair; then he made the actual folds fit his mental images. The comforter in its changed form was placed in the chair, and the article could then be reached. In an incipient way, this child showed the same kind of selective imagination that is possessed by builders of bridges and of houses.

III. The constructive imagination is always aided in its work by the *thinking* power. The image which comes next, no matter how incongruous, is allowed to form a part of

our dream fabric, and often of our web of fancy. When the constructive imagination is at work, thought scrutinizes closely every new arrival in the throng of images. Only those which comparison shows to be the most fit for the purpose in hand are allowed to linger. The inventor never thinks harder than when he is comparing his images with each other and rejecting the unfit. Thought also enables him to change an image in conformity to a certain plan.

The Constructive Imagination the Basis of Progress. — The products of the constructive imagination have been the only stepping stones for material progress. The constructive imagination of primeval man, aided by thought, began to conquer the world. When the winter's cold came, the imagination pictured the skin of the animal on the human body. Will power going out in action merely made that image a reality. If the skin in its natural state did not fit as well as the image indicated, the skin was altered and fastened together until it did approximate to the image. The chimney, the stove, the stage-coach, the locomotive, are successive milestones, showing the progressive march of the imagination.

Materials at the Disposal of the Imagination. — After studying the constructive imagination, the student is likely to have false impressions of its powers. The imagination is always tied to the stake of perception by a cord of greater or less length. The imagination gets every particle of its material from the senses. Let any one note the result when he shuts his eyes and tries to imagine a new color. The imagination is not a creative power, for it must have materials to start with. The popular impression that the imagination can create something out of nothing is utterly

erroneous. A disorderly pile of brick may be fashioned into a house; a shapeless mass of metal may be wrought into a watch, an engine, a sewing machine, or a bicycle; but none of these can be constructed without the fitting raw material. So it is with the imagination, which can transform the raw material of the senses into wonderful forms, but the material must be present at the start. The dreams of a person blind from birth never embody a single image of sight.

The pages of literature verify these statements in a striking way. The picture of Hell in Milton's *Paradise Lost* is suggested by earthly sulphurous fires which are enlarged and combined with other elements. Satan's figure is constructed after the type of the human form; his staff is larger than the colossal pine. The waves of liquid fire might have been suggested by the ocean in a storm. One of the finest elements in Milton's Eden is the thornless rose, the product of the separating power of the imagination. The twenty-first chapter of *The Revelation* contains a grand picture of the Celestial City. We catch glimpses of gold, jasper, pearl, sapphire, emerald, a crystal fountain shaded by a tree whose leaves are ever green, but we look in vain for elements new to earthly experience. They are present simply on a vaster and grander scale, and in new combinations.

Limits of Imagination. — From what has already been said, it follows that the imagination is limited in its workings. A man who has always been deaf will be debarred from constructing images of sounds; a blind man will have no optical images to recombine and alter. The imagination is limited much more narrowly than we often suppose, to the territory of our own experience and to so much of that of others as we interpret in terms of our own. Had the

Almighty revealed to St. John a glimpse of things utterly unlike anything on earth, man could never have understood the description any better than the blind man, who thought scarlet was like the sound of a trumpet, comprehended color.

The infinite cannot be imaged. Let any one project a spherical image toward the zenith, with a radius of a million miles. Let that radius be doubled, and the imagination can still project its image beyond. Let that radius be squared, then raised to a power above the billionth until the imagination is weary. We have not yet imaged the infinite; for common sense would ask: Can we not extend this last image a foot or a mile beyond?

Direction of the Imagination Determined by the Dominant Perceptions. — Since imagination must look to perception for materials and suggestions, it follows that our personal experience must determine the sphere of our imaginative excellence. The Norseman painted his heaven, Valhalla, from the suggestions of his own personal experience, which was mostly in the direction of fighting and eating. Valhalla was an enormous palace roofed with shields. Spears were the pillars which supported the ceiling. The seats were cushioned with coats of mail. The gleam of flashing swords warmed the hall. The amusements consisted of eating and drinking and fighting. A river of ale ran close by Valhalla. The heroes gorged themselves on the flesh of a magic boar, which was renewed every night. They ate and drank until they could hold no more, fell down upon the floor where they had been feasting, were awakened in the morning by the blast of a horn, then all grasped their weapons and rushed out to the battlefield. All day long they fought, putting

each other to sleep with the sword. At nightfall a magical horn was blown, and every hero's wounds were healed. Then there was the mad rush for the river of ale and the flesh of the boar. Had the Teuton been asked if there were no other enjoyments, he would have wondered what heaven could furnish more.

The Indian constructed his heaven out of the materials of his own experience. Heaven was to him nothing but happy hunting grounds, where the game never failed, and where he should again have his dog, his bow and arrows, and his wampum. To him, the Indian summer haze was the smoke from the Great Spirit's peace pipe.

The novelist must know human beings in all their phases before he can write successfully. In whatever line we wish our imaginations to be successful, whether in building houses or bridges, constructing machinery or novels, we must have experience in that special direction.

Imagination in Scientific Investigation. — Results in nature follow each other with comparative slowness. Even where experiment hastens them, the imagination must precede and suggest the new combinations for the experiment. Before a bridge of thought is built connecting two facts, or a cause with an effect, the imagination must first make the connecting leap. We can never realize the connection of two things, until we have first joined them in imagination. All that thought does is to build a firm bridge in the path thus marked out; or thought may show that the imagination was mistaken, and call upon it to indicate another path.

Sir Benjamin Brodie, a former President of the Royal Society, said to its members: "Physical investigation, more than anything besides, helps to teach us the actual value and right use of the imagination — of that wondrous

faculty, which, when left to ramble uncontrolled, leads us astray into a wilderness of perplexities and errors, a land of mists and shadows; but which, properly controlled by experience and reflection, becomes the noblest attribute of man, the source of poetic genius, the instrument of discovery in science, without the aid of which Newton would never have invented fluxions nor Davy have decomposed the earths and alkalies, nor would Columbus have found another continent."

The great scientist Tyndall has said with equal truth: "Philosophers may be right in affirming that we cannot transcend experience; but we can at all events carry it a long way from its origin. We can also magnify, diminish, qualify, and combine experiences, so as to render them fit for purposes entirely new. We are gifted with the power of imagination, and by this power we can lighten the darkness which surrounds the world of the senses. There are tories, even in science, who regard imagination as a faculty to be feared and avoided rather than employed. They had observed its action in weak vessels, and were unduly impressed by its disasters. But they might with equal truth point to exploded boilers as an argument against the use of steam. Bounded and conditioned by coöperant reason, imagination becomes the mightiest instrument of the physical discoverer. Newton's passage from a falling apple to a falling moon was, at the outset, a leap of the imagination."

Unconscious Processes in Imagination. — When we think about a thing, or keep the mind full of a subject, the activity in certain brain tracts is probably much increased. As a result of this unconscious preparation, a full-fledged image may suddenly rise in consciousness. In this way

dreams have resulted in the formation of remarkable constructive images, which have helped an inventor to complete his machine. Goethe says that he wrote the *Sorrows of Werther* almost unconsciously, and afterward marveled at the work. Antecedent brain preparation involved in brooding over such subject matter helped the spontaneous appearance of images. Auditory images frequently whirl through the brain of a musician, even when he is trying to be mentally passive. Professor Höffding says: "The interweaving of the elements of the picture in the imagination takes place in great measure below the threshold of consciousness, so that the image suddenly emerges in consciousness complete in its broad outlines, the conscious result of an unconscious process." The fact should be emphasized, however, that this phenomenon occurs only after the mind has been carefully considering a certain subject.

Influence of the Imagination upon the Body.

Strong Effects of Imagination. — When a mental image is taken for a reality, the most astonishing results often follow; indeed, sometimes they are more pronounced than if the image were a reality. One can find many illustrations of this in everyday life.

A member of a family purchased some perfectly fresh meat, and it occurred to him that the dinner table would afford a good opportunity of testing the power of the imagination on the senses, so he remarked that he was sorry he had not some Frenchmen as guests at dinner, since the meat would have exactly suited them, as it was so gamy and tender that it would not hang on the butcher's hook. Several at once perceived an unmistakably putrid

taste, and one member of the family, unable to endure the odor, left the table.

A fussy man would, at breakfast, occasionally insist that the cream was too sour for his oatmeal, and he made much trouble in sending out for a fresh supply. Finally his wife told the servant to keep some of the same cream outside, and to bring that in whenever there were complaints, with the assurance that it would prove fresh. The new supply always seemed much better to the husband. Tradesmen often take advantage of this power of the imagination when they have a very particular customer, and sell him precisely the same article at an advanced price.

Were it not for this power of the imagination, the majority of quack nostrums would disappear. In most cases bread pills, properly labeled, with positive assurances of certain cure accompanying them, would answer the purpose far better than these nostrums, or even much better than a great deal of the medicine administered by regular physicians.

Warts have been charmed away by medicines which could have had only a mental effect. Dr. Tuke gives many cases of patients cured of rheumatism by rubbing them with a certain substance declared to possess magic power. The material in some cases was metal; in others, wood; in still others, wax. He also recites the case of a very intelligent officer who had vainly taken powerful remedies to cure cramp in the stomach. Then "he was told that on the next attack he would be put under a medicine which was generally believed to be most effective, but which was rarely used." When the cramps came on again, "a powder containing four grains of ground biscuit was administered every seven minutes, while the

greatest anxiety was expressed (within the hearing of the party) lest too much should be given. Half-drachm doses of bismuth had never procured the same relief in less than three hours. For four successive times did the same kind of attack recur, and four times was it met by the same remedy, and with like success."

A house surgeon in a French hospital experimented with one hundred patients, giving them sugared water. Then, with a great show of fear, he pretended that he had made a mistake and given them an emetic instead of the proper medicine. Dr. Tuke says: "The result may easily be anticipated by those who can estimate the influence of the imagination. No fewer than eighty — four fifths — were unmistakably sick."

We have a well authenticated case of a butcher, who, while trying to hang up a heavy piece of meat, slipped and was himself caught by the arm upon the hook. When he was taken to a surgeon, the butcher said he was suffering so much that he could not endure the removal of his coat; the sleeve must be cut off. When this was done, it was found that the hook had passed through his clothing close to the skin, but had not even scratched it.

A man sentenced to be bled to death was blindfolded. A harmless incision was then made in his arm and tepid water fixed so as to run down it and drop with considerable noise into a basin. The attendants frequently commented on the flow of blood and the weakening pulse. The criminal's false idea of what was taking place was as powerful in its effects as the reality, and he soon died.

Many persons make the mistake of thinking that their imagination will never run away with them, that whatever is said on this subject applies only to other people. This class is generally the most sensitive to imaginative influ-

ence While persons differ, it should be remembered that none are exempt from the physical effects of imagination, — neither the learned nor the ignorant. There is perhaps not a person living who would not at times be benefited by a bread pill, administered by some one in whom great confidence was reposed.

The Cultivation of the Imagination.

Imagination a Practical Power. — It was once thought that the imagination should be repressed, not cultivated, that it was in the human mind like weeds in a garden. We have already learned enough to know that the reverse is the truth. In this age there is no mental power that stands more in need of cultivation than the imagination. So practical are its results that a man without it cannot possibly be a good plumber. He must image short cuts for placing his pipe. The image of the direction to take to elude an obstacle must precede the actual laying of the pipe. If he fixes it before traversing the way with his imagination, he frequently gets into trouble and has to tear down his work. Some one has said that the more imagination a blacksmith has, the better will he shoe a horse. Every time he strikes the red-hot iron, he makes it approximate to the image in his mind. Nor is this image a literal copy of the horse's foot. If there is a depression in that, the imagination must build out a corresponding elevation in the image, and the blows must make the iron fit the image.

Necessity of Abundant Perceptional Material. — Since the imagination has not the miraculous power necessary to create something out of nothing, the first essential thing

is to get the proper perceptional material in sufficient quantity. If a child has enough blocks, he can build a castle or a palace. Give him but three blocks, and his power of combination is painfully limited. Some persons wonder why their imaginative power is no greater, when they have only a few accurate ideas.

By perceptional material we mean not only that knowledge which we get from the use of our own senses, but also all information coming to us from the perceptions of other people. An Eskimo will never have an adequate image of the luxuriance of tropical scenery so long as he remains within the polar circle; but he can have far better imaginative realization of such scenery after reading a vivid description by an eye witness. Even then he must interpret all that he reads in terms of the scanty shrubbery with which he is familiar, and his best imaginative picture of tropical foliage will be meager and dwarfed. Imagination always builds on the suggestions of our own experience.

The successful novelist must move among human beings and study, at first hand, as many types as possible. Not until then will his imagination have the necessary material wherewith to work. The Israelites justly complained that they could not make brick without straw. The accumulation of the necessary material is no mean preliminary to building a palace of novel architecture. Perception must sow seed in the soil of memory before a harvest can appear under the guise of constructive imagination and of thought. The person who wishes to begin with the cultivation of the imagination is like the man who looked for a harvest where he had sown no seed.

The Materials at Hand for Cultivating Imagination. — Raw materials of the finest order for the culture of the

imagination are found in the lives of almost all. We may instance the autumnal leaves with their glorious coloring, the wild flowers, the waving fields of grain, the play of lights and shadows in the forests, meadows filled with clover and daisies, orchards blossoming against the delicate spring sky, the singing birds, the clouds painted by the setting sun, the fantastic silver tops of the thunder clouds, the drapery of mist about the mountain side or shifting over the valley, the Milky Way, —

> "A broad and ample road, whose dust is gold,
> And pavement stars," —

the constellation Orion followed by Canis Major in their majestic hunt through the heavens, the Bear, — monarch of the northern heavens, — the Pleiades, human faces with their changing expression. If he has eyes to see them, the life of the meanest has more materials than we have space to mention. We must not suppose that it takes uncommon materials with which to cultivate the imagination. To most persons there could be nothing more prosaic than getting up at two o'clock in the morning to take a train. What room is there for imagination in such an action? Let those who would ask, read the following description by Edward Everett: —

"I had occasion, a few weeks since, to take the early train from Providence to Boston, and for this purpose rose at two o'clock in the morning. Everything around was wrapped in darkness and hushed in silence, broken only by what seemed at that hour the unearthly clank and rush of the train. It was a mild, serene, midsummer's night, — the winds were whist. The moon, then in her last quarter, had just risen, and the stars shone with a spectral luster but little affected by her presence. Jupiter, two hours high, was the herald of the day; the Pleiades, just above the horizon, shed their sweet influ-

ence in the east. . . . Such was the glorious spectacle as I entered the train. As we proceeded, the timid approach of twilight became more perceptible; the intense blue of the sky began to soften; the smaller stars, like little children, went first to rest; the sister beams of the Pleiades soon melted together; but the bright constellations of the west and north remained unchanged. Steadily the wondrous transfiguration went on. Hands of angels, hidden from mortal eyes, shifted the scenery of the heavens; the glories of night dissolved into the glories of the dawn. The blue sky now turned more softly gray; the great watch stars shut up their holy eyes; the east began to kindle."

If Edward Everett had not known the constellations apart, and some of the myths connected with them, he could not have given us this highly imaginative account of what he saw on that morning. His imagination joined past knowledge to present perception. The less present perception one can use, the greater must be his store of accumulated knowledge in order to produce any really fine work of the imagination.

Clear-cut Images. — The formation of accurate images is essential to the right culture of the imagination. A good house cannot be built out of shapeless brick. The use of words without definite corresponding images is fatal to imagination. If we study any branch of science without representing to ourselves by imaginative power the meanings of the various terms, our time is somewhat more than wasted, for we are forming a bad habit. Molecular vibrations, tension of the ether, undulations of varying amplitude and length, valves of the heart, stamens, peltate leaves, Gothic arches, — these are terms which should never be used without the ability to form sharp images in each case. A person who had been talking about defective flues as causes of fires, was asked to state plainly

what he meant by a "defective flue." It was then seen that he had no clear image corresponding to the term, which was simply a mask for ignorance. Persons who allow themselves to use terms in this way must not expect to have much imaginative power.

Pictorial Interpretation Cultivates the Imagination.— Whenever we do not acquire facts at first hand, we should always endeavor to translate them into images. Knowledge will never become vivid until we have done this. Suppose we cannot go to Greenland, India, or Japan, yet we can derive great benefit from reading works of travel, if, as we read, we construct pictures of the inhabitants, buildings, animals, and natural features. Geography, if taught aright, is an excellent study for cultivating the imagination. If rivers, capes, sounds, and isthmuses, the tropics and the polar regions with their natural products, are imaginatively realized, this power is cultivated in the right way.

One reason why historic facts make such an evanescent impression is because they are not translated into mental images. To most persons, William the Conqueror, Edward the First, Oliver Cromwell, the Chaucerian and the Elizabethan Age are little more than names. Realized knowledge is knowledge imaginatively represented.

Culture of the Imagination by Oral Description. — A person learns to do things best by throwing himself on his own resources. An attempt at a clear-cut oral description of something to another person will often deeply impress ourselves and him with the fact that our mental images are hazy, and that the first step towards better description consists in improving them.

Every time we tell a story clearly so as to impress the details on the mind of others, every time we describe a place or a landscape vividly, every time we relate what we have read in a book of travels so as to arouse definite images in the minds of our hearers, — we are cultivating our imagination. It is excellent training for a person to attempt to describe to others a meadow, a grove, an orchard, the course of a brook, the sky at sunrise, the starry heavens. If his description is not heavy, like unleavened bread, the liveliness will be due to the activity of his imagination.

Culture of the Constructive Imagination by Writing. — As soon as knowledge is acquired, it should be used in as many different combinations as possible. No one should gather a mass of materials without attempting original composition. Above all, every person should write something imaginative, not necessarily for publication, but as a matter of cultivation. He may write a description of a place, a mountain, a landscape, a forest, a storm, the ocean, the heavens; he may write a short story, give a prophetic picture of what science will ultimately accomplish, graphically describe the appearance and life of the earth in the carboniferous age, give an account of a day with paleolithic man, or picture a mediæval tournament. The writing of poetry furnishes the finest imaginative exercise. When Burns saw his plowshare turning under a mountain daisy, his imagination at once began to work, and he gave the world an exquisite little poem. Charles Kingsley never did a better thing for his children than when he wrote *Greek Heroes*, to fire their imagination with pictures from Grecian mythology.

Forecasting the plot of a partially read novel, or com-

pleting an unfinished story is excellent practice. Here, one is thrown entirely upon his imagination. For example: —

In ancient Greece a man was riding his horse along a mountain road after nightfall. Suddenly the animal obstinately stopped. The rider thrice, with oaths, plunged the spurs into the horse, the last time wounding him deeply. That instant a flash of lightning revealed a fathomless precipice under the horse's nostrils. The next flash showed the animal the road, and the faithful beast immediately sought it and carried his master home.

In the master's village there was a temple dedicated to the gods. In one end of this, on a level with the ground, there was a room whose door always stood ajar. This was called the room of Justice; and it was intended for the fugitive, the wronged, or any one who feared injustice. When the door was opened wide, it rang a loud bell in the room of the minister of Justice, whose duty it was to come immediately to inquire into the merits of the case.

Fifteen years had passed since the night when the master rode his faithful steed across the mountains. The horse was old and lame, and unable to carry his master longer. One stormy day, toward nightfall, the master drove the horse out of the stable and fastened the door, saying, "Away, you worthless beast, you shall never again enjoy my shelter or eat my grain!"

Darkness came on; the storm increased. The old horse wandered around, seeking shelter. Finally he came to the temple; and, seeing a door ajar, he pushed it open and entered the room of Justice. . . .

Let a vivid pen picture of the appearance of the master, his every feature, be drawn first, then let the living steed be described. With your own feelings as a suggestion,

describe what passed in the mind of the horse on the mountain road, and fifteen years later at nightfall when he was driven from his stable into the storm. Describe the appearance of the minister of Justice, and give a fitting conclusion to the story. After a conscientious trial at this, your imagination will be stronger than before. It will not be long before analogous cases begin to present themselves, perhaps of the way in which children sometimes treat their old parents.

Comparative Value of Following Another's Imagination and Constructing Original Images. — Much reading will not cultivate our constructive imaginations if we always keep tied to the apron strings of the images of other people. If we let another do all the lifting for us, and take all the exercise, we shall get no muscular development. If we take all our images ready made from other people, we shall never have much imaginative power. Critics generally find the source of the plots of Shakespearian plays; but the source is as unlike the finished play as the caterpillar is different from the butterfly. It has been said that Shakespeare breathes into a dead tale a creator's breath of life. "I have no imagination," is a common remark from persons who have, so to speak, kept their imaginations in a sling, like a broken arm.

We should note the difference of energy required in interpreting a ready-made picture and in constructing an original one. We read Milton's description of Eden, and perhaps form interpretive pictures to correspond in a measure to the description. Let us apply the test by closing the book and constructing an original picture of an ideal landscape, as perfect in the number and proportion of elements as it is possible for our imagination to depict

Now we have genuine imaginative effort, — an effort which some people have never experienced.

Coleridge, in *The Ancient Mariner*, imaginatively interprets for us the sound made by the sails of the ship: —

> " . . . The sails made on
> A pleasant noise till noon,
> A noise like of a hidden brook
> In the leafy month of June,
> That to the sleeping woods all night
> Singeth a quiet tune."

Let us try to give a different imaginative interpretation to the sound, and we shall again notice the difference in effort in having some one direct our imagination and in marking out an original path.

No other age has equaled the Elizabethan in imaginative work. This was only partially due to the flood of new material that poured in from the expansion of the known world, through the discoveries of the great navigators, and made the wildest dream seem capable of realization. The Elizabethans used their imaginations on these materials and exerted themselves to a degree to which we are strangers. When the people of that age went to see *Hamlet*, *Macbeth*, *A Midsummer Night's Dream*, or *As You Like It*, they had to employ in every scene all the active imagination of which they were capable. If the scene changed to a different part of the world, a placard bearing the words, Rome, Venice, London, or The Forest of Arden, announced the fact. If there seemed to the spectators to be any change, it was due to the fact that their imaginations projected a new picture upon the stage. To-day we have every accessory of scenery and stage effect to supply what the imagination ought to be required to body forth. Lack of exercise enfeebles any power.

Thinking by Images. — Professor Wundt expresses one side of an important truth when he says: "Imagination is, in reality, a thinking in particular sense ideas. As such, it is the source of all logical or conceptual thought." The man who does not think by images will never be a clear thinker, and those are to be pitied who are compelled to follow him. Tyndall has labored to make this point plain and to show the importance of the imagination in all scientific thought. He says: "How, for example, are we to lay hold of the physical basis of light, since like that of life itself, it lies entirely without the domain of the senses? . . . Bring your imaginations once more into play and figure a series of sound waves passing through air. Follow them up to their origin, and what do you there find? A definite, tangible, vibrating body. It may be the vocal chords of a human being, it may be an organ-pipe, or it may be a stretched string. Follow in the same manner a train of ether waves to their source, remembering at the same time that your ether is matter, dense, elastic, and capable of motions subject to and determined by mechanical laws. What then do you expect to find as the source of a series of ether waves? Ask your imagination if it will accept a vibrating multiple proportion — a numerical ratio in a state of oscillation? I do not think it will. You cannot crown the edifice by this abstraction. The scientific imagination which is here authoritative, demands as the origin and cause of a series of ether waves a particle of vibrating matter quite as definite, though it may be excessively minute, as that which gives origin to a musical sound. Such a particle we name an atom or a molecule. I think the seeking intellect, when focused so as to give definition without penumbral haze, is sure to realize this image at the last. . . . The waves generated in the ether

by the swinging atoms of luminous bodies are of different lengths and amplitudes. The amplitude is the width of swing of the individual particles of the wave. In water waves it is the height of the crest above the trough, while the length of the wave is the distance between two consecutive crests."

Many persons glibly discuss hypotheses without having thought them out to their source by the aid of images, and hence without a clear idea as to whither the theory tends. In the same way as in the case of sound and light, Tyndall translates the evolution hypothesis into the most definite images of which it is capable. He says: "Not alone the more ignoble forms of animalcular or animal life, not alone the nobler forms of the horse and lion, not alone the exquisite and wonderful mechanism of the human body, but the human mind itself — emotion, intellect, will, and all their phenomena — were once latent in a fiery cloud. . . . All our philosophy, all our poetry, all our science, and all our art — Plato, Shakespeare, Newton, and Raphael — are potential in the fires of the sun." One can reject or accept such a hypothesis much more intelligently after he has resolved the nebula into its potential images.

The Formation of an Ideal.— This necessary product of the imagination gives excellent culture. The young take no more important step than when they frame an ideal which they will ever strive to attain. The first step consists in studying the lives of illustrious men, to ascertain what constitutes a noble and glorious life, to see how obstacles are surmounted, how eminence is gained. The next step is to select the most worthy attributes and to embody them in an ideal which is peculiarly fitted to the constructor. Each one may thus construct for himself a

life chart as an ideal. Something is to be learned from the life of every great man. Thus, an ideal may embody the energy of a Napoleon; the integrity and patriotism of a Washington; the iron will of a Cromwell; the sympathy with humanity of a Howard, a Clarkson, or of a greater One; the ambition of a Newton or a Franklin to discover new laws; the inventive genius of a Watts, a Morse, or an Edison; the determination of a blind Milton to leave behind something worthy of himself, which posterity would not willingly let die.

The youth who has not had his imagination fired by great deeds will not amount to much. Each must fashion for himself an ideal which he is determined to attain. Emerson's expression, "Hitch your wagon to a star," meant simply this. The imagination of the youthful Napoleon was animated by reading the deeds of great generals, and he early formed the ideal of doing more in the military field than had ever before been accomplished.

Imagination and Sympathy.—It is just beginning to be clearly understood that unimaginative people cannot be sympathetic. In order to sympathize truly with another in fortune, misfortune, or suffering of any kind, we must, from the suggestions of our experience, imagine ourselves in his place. The experience of two persons is never exactly the same. In order to sympathize with the other, the one must, perhaps from very slight suggestions in his own experience, and by an effort of the constructive imagination, put himself in the other's place. Persons of undoubted capacity for feeling are frequently unsympathetic and undesirable to live with, merely because imagination seldom unlocks the door to feeling. It is not enough for a thirsty traveler that there is water at the bottom

of a deep well; there must be means of drawing that water.

Nor is it enough that a person has strong emotional tendencies in the direction of sympathy; there must be some means of drawing from that emotional fountain. Imagination can furnish the means. If one would sympathize with the sick and suffering poor, he must first go among them; then his imagination will fit the materials of perception to his own case. A child can rarely sympathize deeply with old people, because he has had little community of experience with them. On the other hand, imaginative old people can sympathize deeply with him, although their disappointments and pleasures may have been only remotely akin to his.

Abuse of the Imagination. — From its very nature the imagination is peculiarly liable to abuse. The common practices of daydreaming or castle-building are both morally and physically unhealthful. We reach actual success in life by slow, weary steps. The daydreamer attains eminence with one bound. He is without trouble a victorious general on a vast battlefield, an orator swaying thousands, a millionaire with every amusement at his command, a learned man confounding the wisest, a president, an emperor, or a czar. After reveling in these imaginative sweets, the dry bread of actual toil becomes exceedingly distasteful. It is so much easier to live in regions where everything comes at the stroke of the magic wand of fancy. Not infrequently these castle-builders abandon effort in an actual world. Success comes too slow for them. They become speculators or gamblers, and, in spite of all their grand castles, gradually sink into utter nonentities in the world of action.

The reading of too much fiction is dangerous. The impossible stories that have been sown broadcast over the land have wrecked many a young life. From their teaching, young persons have imagined that they could dream themselves into success. It has been well said that even novels of the better class are sweets, and should form no greater proportion of our reading than do sweets of our diet. The young should never allow themselves to build any imaginative castle, unless they are willing by hard effort to try to make that castle a reality. They must be willing to take off their coats, go into the quarries of life, chisel out the blocks of stone, and build them with much toil into the castle walls. If castle-building is merely the formation of an ideal, which we show by our effort that we are determined to attain, then all will be well.

CHAPTER VIII.

THOUGHT.

The Power of Thought.— The human mind can perceive, remember, and imagine. Fortunately, it can also *think*. What is it to think? To think is to compare things with each other, to notice wherein they agree and differ, and to classify them according to these agreements and differences. It enables us to put into a few classes the billions of things that strike our perceptive faculties; to tie things with like qualities into a bundle by themselves, and to infer that what is true of one of these things will be true of the others without actual experience in each individual case; and to introduce law and order into what at first seemed a mass of chaotic materials.

We might suppose a man to be created full grown at birth, and to be placed on a new planet. If he touched a bee and was stung, he would be apt to remember the appearance of the insect. When he saw another insect, he would be likely to compare it with his mental image of the bee. If he noticed a resemblance and avoided the insect, he would *think*. If he noticed the difference between bees and flies and concluded that it was not necessary for him to be so careful about disturbing flies, he would have carried the thought process still further. If a man had no power of thought, being stung once would not answer; he might rush into a swarm of bees and be blinded or killed. It is

by thinking that men have learned to avoid poison ivy, centipedes, snakes, late hours, foul air, dissipated habits. Nature is constantly using her power to kill off the thoughtless, or to cripple them in life's race. She is determined that only the fittest and the descendants of the fittest shall survive. By the "fittest" she means those who have thought and whose ancestors have thought and profited thereby.

Geologists tell us that ages ago there lived in England bears, tigers, elephants, lions, and many other powerful and fierce animals. There was living contemporaneous with them a much weaker animal, that had neither the claws, the strength, nor the speed of the tiger. In fact this human animal was almost defenseless. Had a being from another planet been asked to prophesy, he would undoubtedly have said that this helpless animal would be the first to be exterminated. And yet every one of those fierce creatures has succumbed either to the change of climate, or to man's inferior strength. The reason was that man had one resource denied to the animals, the power of progressive thought. The land sank, the sea cut off England from the mainland, the climate changed, and even the strongest animals were helpless. But man changed his clothing with the changing climate. He made fires; he built a retreat to keep off death by cold. He thought out means to kill or to subdue the strongest animals.

Had the lions, tigers, or bears possessed the power of progressive thought, they could have combined, and it would have been possible for them to exterminate man before he reached the civilized stage. The swallow builds her nest now as she built it a thousand years ago. The beaver has not improved in the construction of his home. Man no longer sleeps in caves. The smoke no longer fills

his home or finds its way out through the chinks in the walls or a hole in the roof. In traveling, he is no longer restricted to his feet or even to horses. For all this improvement man is indebted to *thought*. That has harnessed the very vibrations of the ether to do his bidding.

The Thinking Power Active from the First. — It was formerly supposed that human beings did not think early in life; that then they perceived and remembered; that after they had seen and treasured up a great deal, they began to think. These processes were considered to be as sharply marked off from each other as the Dead Sea and the ocean. We now know that no one can perceive without thinking at the same time. In perceiving a complex object, such as a house, a ship, or a tree, we are constantly dividing it into parts and discriminating between them. We discriminate between the doors and the chimneys, the leaves and the branches, the sails and the masts. If we perceive any simple thing definitely, *e.g.* a bird perched on a post, we must distinguish between the bird and the post, or between the bird and other things, or we do not really perceive the bird.

Again, in remembering, we must think, in order to discriminate between different mental images. If we are asked to describe two fine houses on opposite corners of an avenue, we must summon the images and compare them. One house has a bay window, the other none. If we mistook the image of one thing for another, our memories would be worthy of no trust. This power of discrimination is due to thought. An educated person in recalling the Latin words *annus* and *servus*, or the German word *Baum*, is apt to recall and compare the English words *annual*, *servile*, *beam*.

In imaginative productions that amount to anything, thought must work vigorously. When the sculptor starts to chisel out a statue of Hebe or Venus, he must continually consider the relations of the different parts to each other. One arm must correspond in size and length to the other. The features must be in harmony. There must be a certain correspondence between the statue and an actual woman. Thought is called in at every step in order to make comparisons. When a bridge is to be built, the imagination in throwing it across the chasm must be guided by thought, which declares what is possible. The same is true in the case of an inventor.

On the other hand, it must be remembered that thought is the last of the mental powers to come to its full maturity. Memory often shows undoubted signs of failing vigor, while thought is still advancing in strength.

I. The Concept.

First Step in Thinking. — In describing the various steps leading to a finished product of thought, we must remember that they are not sharply defined in actual thinking. In order to get a clear idea of the thought process, and avoid confusion, we are compelled to separate certain elements for study. We do the same thing in studying trees, plants, insects, architecture, or any form of matter.

A concept is formed in the following manner: —

(1) There must first be *presentation* of materials. Suppose we wish to form the concept *fruit*. We must first perceive the different kinds of fruit, — cherry, pear, quince, plum, currant, apple, fig, orange, etc. Before we can take the next step, we must be able to form distinct and accurate images of the various kinds of fruit. If the concept is to be

absolutely accurate, not one kind of fruit must be overlooked. Practically, this is impossible; but many kinds should be examined. Where perception is inaccurate and stinted, the products of thought cannot be trustworthy. No building is firm if reared on insecure foundations.

(2) The second step consists in *comparing* different individuals and in noting wherein they agree or differ. For instance, in the case of the currant and the gooseberry, we must compare their flavor, size, appearance, manner of growth, seeds. We may next compare the strawberry with the blackberry, the pear with the peach, the grape with the plum. We shall in this way have the likenesses and differences brought out vividly.

(3) The process of *abstraction* must next be employed. Fruits have many confusing qualities of size, color, shape, seed, skin, etc. We do not wish to have size enter into our general idea or concept of fruit, so we abstract (*ab*, away from; *traho*, draw) size, color, etc., since these qualities differ so vastly in different fruits. The currant and the lemon, the grape and the peach, have little in common in regard to either size or color. We abstract or draw off all qualities not common to the class under consideration, since the concept must be made up of common qualities. By abstraction we also draw off the like qualities by themselves for consideration. In the case of fruit, the juiciness and nutritive properties, for instance, would be retained, together with the distinctive properties of production from a flower and of containing seed. In the process of abstraction, we draw our attention away from a mass of confusing details, unimportant at the time, and attend only to qualities common to the class. Abstraction is little else than centering the power of attention on some qualities to the exclusion of others.

(4) The next step is *generalization*. We put all objects having like qualities into a certain *genus*, or class. When the objects are in that class, we know that certain qualities will have general application to them all. We thus know that all fruits will have certain common qualities, which at once mark them off from the mineral or the animal kingdom and from other vegetable products.

(5) Lastly, we affix a name to the class. This is called *denomination*, or marking off by a name. The name is analogous to a string which ties together a number of things; or it is like a druggist's label, which enables him to tell at a glance what each bottle contains. We use the names like the algebraic symbols x and y. We are thus able to reason with great rapidity, and to have a greater number of concepts pass more quickly before the field of our mental vision. By algebraic formulas we can solve problems, which it would be impossible for us to carry in our heads or solve without the aid of symbols. Words stand in the same relation to thought.

Method of Forming Concepts in Actual Life. — A child sees a certain object frequently and hears the term "man" applied to it. The child will first form its concept on an insufficient foundation of perception. If the men that he sees in his own home all have beards, the child will think that having whiskers or a moustache is a quality necessary to man, and the concept will include that. Should the child at first see only red-haired men six feet tall, those qualities would go into the concept *man*. As acquaintance with human beings extended, the child would abstract the beard, color of hair, and height from the concept. In comparing a smooth-faced man, a short man, a tall man, a red-haired and a white-haired man, the child would soon

notice a sufficient number of common qualities to put all in one class.

A certain Norwegian child ten years old had the quality *white*, firmly imbedded in his concept *man*. Happening one day to see a negro for the first time, the child refused to call him a man, until the negro's other qualities compelled the child to revise his concept and to eliminate whiteness. If that child should ever see an Indian or a Chinaman, the concept would undergo still further revision. A girl of six, reared with an intemperate father and brothers, had the quality of *drunkenness* firmly fixed in her concept of man. A certain boy kept, until the age of eleven, *trustworthiness* in his concept of man. Another boy, until late in his teens, thought that man was a creature who did wrong not from determination but from ignorance; that any man would change his course to the right path, if he could only understand that he was going wrong. Happening one day to hear of a wealthy man who was neglecting to provide comforts for his aged mother in her last sickness, the boy concluded that the man did not know the mother's condition. When he informed the man, the boy was told to mind his own business. The same day he heard of some politicians who had intentionally cheated the city in letting a contract, and he immediately revised his concept.

It must be borne in mind that the most of our concepts are subject to change during our entire life; that at first they are made only in a tentative way; that experience may show us, at any time, that they have been erroneously formed, that we have abstracted too little or too much, made the class too wide or too narrow, or that here a quality must be added or there one taken away.

Difference between a Concept and an Image. — It is always difficult for those who have paid little attention to mental processes, to understand, at first, why an image cannot be formed of a concept. An image possesses the qualities and peculiarities of an individual object. If a certain man has an aquiline nose, black hair, bushy eyebrows, and a scar on his cheek, all these peculiarities must appear when memory recalls an image of him. It is impossible to image anything without giving that image individual marks.

The best mental images are so definite that a picture could be painted from them. A being might come under the class *man* and have a snub nose, blonde hair, scanty eyebrows, and no scar on his face. The presence of one of these individual peculiarities in the concept *man* would destroy it. If we form an image of an apple, it must be either of a yellow, red, green, or russet apple, either as large as a pippin or as small as a crab apple. A boy was asked what he thought of when "apple" was mentioned. He replied that he thought of "a big, dark-red apple with a bad spot on one side, near the top." That boy could image distinctly, but his power of forming concepts was still in its infancy.

An image must contain the individual qualities of an object; a concept must embody only those qualities common to the entire class. We may put in our concept *man* the qualities of progressive reasoning, of being able to improve his condition from age to age, of using a highly developed language, of mastering nature to an extent equaled by no other animal. These qualities are a mark of the entire class, while a brown eye or a large mouth are marks of certain individuals only.

We should in all cases be ready to translate our con-

cepts, when occasion requires, into the images of those individuals which the concept represents. A concept means nothing except in reference to certain individuals. Without them, it could never have had existence, and they are entitled to representation. A man who cannot translate his concepts into definite images of the proper objects is fitted neither to teach, preach, nor practice any profession. He should waste as little as possible of the time of his fellow-mortals in talking to them. There was, not long ago, a man very fond of talking about fruit in the abstract; but he failed to recognize an individual cranberry when it was shown him. A humorist remarked that a certain metaphysician had such love for abstractions, and such intense dislike for concrete things, as to refuse to eat a concrete peach when placed before him. A person should not talk about historic chivalry in the abstract unless he can describe in the concrete the figures and armor of the knights, their castles, and their habits in peace and in war.

Abstract Ideas.—While we are forming concepts, we abstract or draw off certain qualities, either to leave them out of view or to consider them by themselves. Our dictionaries contain such words as purity, sweetness, whiteness, industry, courage. No one ever touched, tasted, smelled, heard, or saw purity or courage. We do not, therefore, gain our knowledge of those through the senses. We have seen pure persons, pure snow, pure honey; we have breathed pure air, tasted pure coffee. From all these different objects we have abstracted the only like quality, the quality of being pure. We then say we have an idea of purity, and that idea is an abstract one. It exists only in and for the mind which formed it. No one ever saw

whiteness. He may have seen white clouds, snow, cloth, blossoms, houses, paper, horses, but he never saw whiteness by itself. He simply abstracted that quality from various white objects.

The difference between an abstract idea and a concept is that a concept may consist of a bundle of abstract ideas. If the class contains more than one common quality, so must the concept; it must contain as many of these abstracted qualities as are common to the class. The concept of the class *whale* would embody a large number of such qualities.

Abstract Ideas Conditioned by Experience. — The South-Sea Islander's idea of purity is far different from that of the Anglo-Saxon. The idea of piety of either the Pagan or the Moslem differs from that of the Christian. The Irish peasant's idea of cleanliness is not the same as that of the graduates of medical colleges. Our ideas of any abstract quality will differ as our experience differs. Contrast the Indian's ideas of finery with those of a refined Caucasian. Since the abstract ideas differ, the concepts will also differ. It would be interesting to compare the different concepts of home which exist in the minds of the Eskimo, the Fiji Islander, the Indian, the Hottentot, and the Saxon. A street gamin was asked his idea of home, and he replied, "A big dry-goods box with plenty of rags in winter."

Some philosophers might say that these are not instances of *perfect* abstract ideas or concepts. The proper reply is that it is sometimes wise to study things as they exist, and not always as they ought to be. It is of the utmost importance for us to notice the difference in the abstract ideas and concepts of individuals; otherwise we shall be puzzled to account for the divergence of thought in dif-

ferent people. The person whose concept of home has been formed in a pleasant, attractive spot, surrounded by loving relatives, will think and act very differently from the gamin or the tramp, when anarchy or political corruption threatens the existence of homes in general.

Intension and Extension. — If we are asked what occurs to us when the term "bird" is mentioned, we may give two different answers, according as we consider the meaning of the term in intension or extension. If we reply that a bird is an oviparous animal possessed of certain qualities, and if we think of the feathers, the structure of the bones and the stomach, and the manner of locomotion, we are thinking of the qualities which birds possess. *Intension* considers only those qualities which are common to a class.

If, on the other hand, there come to mind the robin, swallow, catbird, thrush, crow, hawk, canary, magpie, etc., we are thinking of the different individuals to which the term "bird" is applicable. *Extension* has reference to all individuals denoted by any class name, and not to their common qualities.

In the formation of a concept we notice that, as we narrow the class, the more qualities do we have to put into the concept. When we form a concept answering to *animal*, we can put very few qualities into that, because very few are common to all animals. We cannot include the attribute "having a backbone," because oysters have none; nor "having feet," because worms have none; nor "having ears," because it is doubtful if mollusks have any. When we form a concept of one species of animal, *e.g.* *horse*, the common qualities are far more numerous. All the qualities found in the concept *animal* must also be

found in *horse*. In addition to these we have many other qualities common to horses, such as having four feet, solid hoofs, teeth, a hairy skin, a backbone, ears, eyes, etc.

As the intension of a term increases, the extension decreases; and as the extension increases, the intension decreases. We can see the truth of this general law in the example we have just considered. *Animal* is very narrow in intension, very broad in extension. There are few qualities common to all animals, but there is a vast number of animals. To give the full meaning of the term in extension, we should have to name every animal, from the microscopic infusoria to the tiger, from the angleworm to the whale. When we decrease the extension to one species of animal, *horse*, the individuals are fewer, the qualities more numerous. When we are at the stage of comparison in forming concepts, we are concerned with intension alone; when we are generalizing or classifying, we are also concerned with the extension of the term.

II. Judgment.

Second Step in Thinking. — When we have two concepts, we proceed to compare them, and to decide whether they agree. This process is called *judgment*. For this act there must be two concepts, and agreement or disagreement must be asserted to exist between them after the proper comparison has been made. We have the concept *horse* and the concept *animal*. We compare them and decide that they agree. *A horse is an animal*. That statement embodies a *positive* judgment. We may compare the concept of *horse* and *zebra* and notice that they disagree. *A horse is not a zebra*. This is a *negative* judgment.

Judgment is necessary in forming concepts. When we

decide that a quality is, or is not, common to a class, we are really judging. This is another evidence of the complexity and unified action of the mind.

The process of judgment is always a choice between two, and only two, alternatives at any given time. If we have the concept of *panther* and of the *genus felis* before our minds, we must decide that the panther either belongs, or does not belong, to the cat tribe. The boy who is pondering over a captured bat must come to the conclusion that a bat either is, or is not, a bird.

Were isolated concepts possible, they would be of very little use. Isolated facts are of no more service than unspun wool. We might have a concept of a certain class of three-leaved ivy, as we might also of poisons. Unless judgment linked these two concepts and decided that this species of ivy is poisonous, we might take hold of it and be poisoned. We might have a concept of bread, and also one of meat, fruits, and vegetables. If we also had a concept of food, unrelated to these, we should starve to death, for we should not think of them as foods. A vessel, supposing itself far out at sea, signaled another vessel that the crew were dying of thirst. That crew certainly had a concept of drinkable things and also of water. To the surprise of the first, the second vessel signaled back, "Draw from the sea and drink. You are at the mouth of the Amazon." The thirsty crew had not joined the concept *drinkable* to the concept of the water over the ship's side. A man having taken an overdose of laudanum, his wife lost much valuable time in sending out for antidotes, because certain of her concepts had not been connected by judgment. She had good concepts of coffee and of mustard; she also knew that an antidote to opium was needed; but she had never linked these concepts and

judged that coffee and mustard are antidotes to opium. The moment she formed that judgment she was a wiser woman, for her knowledge was related and usable.

Why Judgments are Often Difficult to Form.—In actual life things present themselves to us with their qualities disguised or obscured by other conflicting qualities. Men had for ages seen burning substances and had formed a concept of them. A certain hard, black, stony substance had often been noticed, and a concept had been formed of it. This concept was imperfect; but it is very seldom that we meet with perfect, sharply defined concepts in actual life. So it happened that for ages the concept of burning substance was never linked by judgment to the concept of stone coal. The combustible quality in the coal was overshadowed by its stony attributes. "Of course, stone will not burn," people said. One cannot tell how long the development of mankind was retarded for that very reason. England would not to-day be manufacturing products for the rest of the world, had not some one judged coal to be a combustible substance.

The Grecians had a concept of electricity, but its qualities were overshadowed by the more apparent ones of amber, in which the Grecians first noticed electrical phenomena. At the beginning of the nineteenth century, the most acute thinkers had not conceived of electricity as force resident in vibrations of the ether. It took geniuses in judging to conceive of electricity as a power capable of drawing cars, of moving machinery, of lighting cities, and of carrying messages across the ocean. Since the concept of electricity has been linked to the concept of a force, or the product of a force, applicable to almost any purpose, the world has been revolutionized.

Judgment is the power revolutionizing the world. The revolution is slow because nature's forces are so complex, so hard to be reduced to their simplest forms, and so disguised and neutralized by the presence of other forces.

The progress of the next hundred years will join many concepts, which now seem to have no common qualities. If the vast amount of energy latent in the sunbeams, in the rays of the stars, in the winds, in the rising and falling of the tides, is treasured up and applied to human purposes, it will be a fresh triumph for judgment. This world is rolling around in a universe of energy, of which judgment has as yet harnessed only the smallest appreciable fraction. Fortunately, judgment is ever silently working and comparing things that, to past ages, have seemed dissimilar; and it is continually abstracting and leaving out of the field of view those qualities which have simply served to obscure the point at issue.

III. Reasoning.

Third Step in Thinking.—As in judgment we compare two concepts and decide that they agree or differ, so in reasoning we compare two judgments. From this comparison we draw a third judgment, thus completing the process of reasoning. If we saw red-hot irons lying on a blacksmith's anvil, we should not pick them up, because, at some previous time, we had gone through with the following chain of reasoning:—

> All red-hot substances are capable of burning.
> These metals are red-hot substances.

Here we have two judgments. First, we decide that the concept of red-hot substances agrees with the concept

of things capable of inflicting a burn. Secondly, we join the concept of the metals on the anvil to the concept of red-hot substances. We now have two concepts agreeing with the same third concept, and hence they must agree with each other. *Capable of burning* agrees with red-hot substances. *These metals* agree with red-hot substances. Hence we form our third judgment: *These metals are capable of burning.* This is a *positive* judgment deduced from two previous judgments.

If we were in doubt as to whether a whale was a fish, we might frame two judgments of this kind:—

All fish are cold-blooded animals.
A whale is not a cold-blooded animal.

In our first judgment we join our concept of fish to our concept of cold-blooded animals. Next, we compare the concept of whales with the concept of cold-blooded animals, and find that there is disagreement. Now, since we have the concept of fish agreeing, and the concept of whales disagreeing, with the same third concept, *cold-blooded animals*, these concepts cannot agree with each other. Hence, we say: *A whale is not a fish.* This is a *negative* judgment.

Thinking, therefore, requires three processes for its completion: (1) the formation of the *concept*, (2) *judgment*, (3) *reasoning*. In actual thinking these three processes are frequently consolidated into one act.

Inductive Reasoning.— Man has to find out through his own experience, or that of others, the major premises from which he argues or draws his conclusions. By induction we examine what seems to us a sufficient number of individual cases. We then conclude that the rest of these

cases, which we have not examined, will obey the same general law. The judgment, *All men are mortal*, was reached by induction. It was observed that all past generations of men had died, and this fact warranted the conclusion that all men living will die. We make that assertion as boldly as if we had seen them all die. The premise, *All cows chew the cud*, was laid down after a certain number of cows had been examined. If we were to see a cow twenty years hence, we should expect to find that she chewed her cud. It was noticed by astronomers that, after a certain number of days, the earth regularly returned to the same position in its orbit, the sun rose in the same place, and the day was of the same length. Hence, the length of the year and of each succeeding day was determined, and the almanac maker now infers that the same will be true of future years. He tells us that the sun on the first of next December will rise at a given time, although he cannot throw himself into the future to verify the conclusion.

It is very fortunate that the human mind is given the faculty of inferring the existence of a universal law from the examination of a certain number of individual phenomena. This power, like all other powers, is attended with danger, but if we were compelled to test each new case before we acted, we should waste the most of our short lives. The doctor would always have to be determining the action of the same remedies. The chemist could not be sure that a new sample of water could be resolved into hydrogen and oxygen. The bridge builder could not tell in advance whether steel would serve for its construction. The only way to find out whether a new specimen of red-hot iron would burn would be to take hold of it. To ascertain whether arsenic not already tested would

prove poisonous, we should have to swallow it. The power of inductive reasoning frees us from these necessities and enables us to travel with seven-league boots among the facts of life.

Perfect and Imperfect Induction. — When every object concerning which a statement is to be made has been examined, the induction is *perfect*. For instance, if we went to a certain island in the Baltic Sea, interviewed every inhabitant, and found out that he was of Teutonic descent, our induction would be perfect. If we examined all the factories in a certain town and found that all were engaged in making cotton goods, our induction would be perfect. If we went to a certain home, examined all the inmates, and found them to be retired soldiers, our statement that none but soldiers are admitted to the privileges of that home, would be founded on perfect induction. When a storekeeper knows what each shelf contains; a housewife, what each drawer holds; a farmer, what crop is planted in each lot, — the knowledge is based on perfect induction. There was never a good librarian, stock raiser, farmer, shopkeeper, chemist, druggist, housewife, or manufacturer, without stores of knowledge obtained through perfect induction, or, in other words, without some definite knowledge of every individual object standing in certain relations to the owner or controller.

Important as this knowledge is, it is excelled in importance and amount by inferences from imperfect induction. Whenever we make a statement, such as, *All men are mortal*, without having tested each individual case, or, in other words, having seen every man die, we are reasoning from *imperfect* induction. Every time a man buys a piece of beef, a bushel of potatoes, or a loaf of

bread, he is basing his action on inference from imperfect induction. He believes that the beef, potatoes, and bread will prove nutritious food, although he has not actually tested those special edibles before purchasing them. They have hitherto been found to be nutritious on trial, and he argues that the same will prove true of these special instances. Whenever a man takes stock in a new national bank, a manufactory, or a bridge, he is arguing from past cases that this special investment will prove profitable. We instinctively believe in the uniformity of nature; if we did not, we should not consult our almanacs. If sufficient heat will cause phosphorus to burn to-day, we conclude that the same results will follow to-morrow, if the circumstances are the same.

The Danger in Hasty Inference. — Men must constantly employ imperfect induction in order to advance; but great dangers attend inductive inferences when made from too narrow experience. A child has experience with one or two dogs at his home. Because of their gentleness, he argues that all dogs are gentle. He does not, perhaps, find out the contrary until he has been severely bitten. His induction was too hasty. He had not tested a sufficiently large number of dogs to form such a conclusion. From one or two experiences with a certain crop in a certain latitude, a farmer may argue that the crop will generally be profitable, whereas it may not again prove so for years. A man may have trusted a number of people and found them honest. He concludes that people as a rule are honest, trusts a certain dishonest man, and is ruined.

The older people grow, the more cautious they generally become in forming inductive conclusions. Many instances are noted and compared; but even the wisest sometimes

make mistakes. It once was a generally accepted fact that all swans were white. Nobody had ever seen a dark swan, and the inference that all were white was regarded as certainly true. Black swans were, however, found in Australia.

In some cases the examination of a very few instances will give a reasonably certain conclusion. Within certain limits we may, roughly speaking, lay down the following guiding principle: Where there are logical reasons for the exact similarity of a new instance to others already examined, we may infer the similarity quite boldly, although we are familiar with but a few individuals of that class. From the examination of a few cases we might infer that all men had lungs. There is a logical necessity why this should prove true. If the interior angles of one triangle are equal to two right angles, we may infer that this will be true of all triangles, because we see that all triangles must stand in similar relations to this one.

On the other hand, there is no reason why a swan should be white rather than green or yellow or black. The color does not interfere with similarity of shape, structure, and habits. We might infer that all swans would have webbed feet, bills, feathers, etc., because the absence of these would change the nature of the fowl and render a new specimen unlike the old in vital points. Comparison and search for similar qualities are necessary factors in all reasoning.

Deductive Reasoning. — After induction has classified certain phenomena and thus given us a major premise, we proceed deductively to apply the inference to any new specimen that can be shown to belong to that class. Induction hands over to deduction a ready-made major

premise, *e.g. All scorpions are dangerous.* Deduction takes that as a fact, making no inquiry about its truth. When a new object is presented, say a possible scorpion, the only troublesome step is to decide whether the object is really a scorpion. This may be a severe task on judgment. The average inhabitant of the temperate zone would probably not care to risk a hundred dollars on his ability to distinguish a scorpion from a centipede, or from twenty or thirty other creatures bearing some resemblance to a scorpion. Here there must be accurately formed concepts, and sound judgment must be used in comparing them. As soon as we decide that the object is really a scorpion, we complete the deduction in this way: —

All scorpions are dangerous.
This creature is a scorpion.
This creature is dangerous.

The reasoning of early life must be necessarily inductive. The mind is then forming general conclusions from the examination of individual phenomena. Only after general laws have been laid down, after objects have been classified, after major premises have been formed, can deduction be employed.

Primary Laws of Thought.

We can lay down three positive laws which the mind must obey in thinking correctly.

Law of Identity. — *The same quality or thing is always the same quality or thing, no matter how different the conditions in which it occurs.* Theoretically, it seems easy to be able to recognize a thing as the same that we have seen before; practically, however, the recognition is often

difficult. We meet a person to-day; next week we see him on the street differently attired, and fail to recognize him. In studying certain constellations, the student frequently has trouble in identifying them when they have moved to another position and appear to be inverted. A doctor often has great trouble in identifying a disease, because it is complicated with so many other conditions. Cases of typhoid fever have existed for weeks without identification by excellent physicians. The law of identity declares that a case of typhoid fever is always a case of typhoid fever; the trouble is to recognize it as such. A masked man is the same man as before, but he may go unrecognized; so may a certain plant. If a person could always detect the same as the same, he would less often fall a victim to rascality in new guises.

Law of Contradiction. — *No thing can at the same time and place both be and not be.* A man cannot be both honest and dishonest at the same time; nor can an animal be both dead and alive. A piece of cloth cannot be both red and not red; but it may be red in one spot, black in another, white in another. The entire piece may be afterwards dyed blue, but it can never be both red and not red in the same place and at the same time.

Law of Excluded Middle. — *Everything must either be or not be; there is no other alternative or middle course.* Let the thing be apple and the quality sour. We may take any conceivable quality and assert one of two possibilities; the quality either does or does not belong to the thing. We may not know what a samovar is, but we can truthfully assert that it must be either yellow or not yellow, metallic or not, blue-eyed or not, bald or not.

A plausible exception to this law may be urged. It may be said that it will not do to assert that water is warm or cold, for it may be lukewarm, neither warm nor cold. This law empowers no one to make any such assertion. We must always keep to the same quality, *e.g.* warmth; then we can say that the water is either warm or not warm. If it is lukewarm, it is not warm; if it is cold, it is not warm. It will not do to say that an object must be either white or black, for it may be blue or green; but we can say that it is either white or not white. We can always affirm of anything either that it has, or has not, a certain quality; but, from the absence of the quality, we cannot affirm the possession of the opposite quality.

Professor Jevons said of these three laws: "Students are seldom able to see at first their full meaning and importance. All arguments may be explained when these self-evident laws are granted; and it is not too much to say that the whole of logic will be plain to those who will constantly use these laws as the key" (1).

Relations Traced out by the Mind.

The Most Important Relations. — We have seen that thinking consists essentially in ferreting out relations and in comparing them. What are some of the relations actually detected as we move about the world?

We see a ship, with full sail set, entering a harbor in which other ships are lying at anchor. The next day we see what we decide to be the same ship, lying with furled sails beside the wharf. We have traced out the first thought relation, *identity*. We discovered this relation of identity by comparing the memory image of the ship with the objective ship. Secondly, we notice the yardarms,

masts, rigging, quarter-deck, rudder, etc. We see these, not as isolated objects, but as related to the whole ship. We thus reach the relation of *whole and parts.* Thirdly, we notice that the ship extends for a considerable distance along the wharf, that she is much larger than a pleasure boat just passing the end of the wharf. We are now considering the ship's relation to *space*. Fourthly, we compare this ship with other ships and notice a *resemblance.* Fifthly, we compare the ship with a brig, a sloop, or the wharf, and detect a *difference.* Sixthly, we notice that she has three masts, two anchors, one rudder. We thus cognize *quantitative* relations. Seventhly, we remember that we saw her sailing yesterday, and we wonder how long she will lie at the wharf, how long her next voyage will be, how long she has been built. We are now busied with *time* relations. Eighthly, we observe that the ship is thumping against the wharf. We wonder how that can be on such a calm day. We see a steamer rapidly passing and observe that she makes the waves. We are now studying the relations of *cause and effect.* Ninthly, we notice how admirably the ship was built to carry a large cargo safely and at the same time to be propelled swiftly. We are now contemplating the relation of *design*, or means to achieve definite ends. These nine relations are the most important ones traced out by the mind.

Intuitive Knowledge.

Theories about Intuition. — Some psychologists claim that we have knowledge obtained neither through induction nor deduction; that we recognize certain truths the moment we perceive certain objects, without any process of inference. Under the head of intuitive knowledge are classified

such cases as the following: We perceive an object and immediately know it in a time relation, as existing now or then. We are said to have an intuitive concept of time. When we are told that the whole is greater than a part; that things equal to the same thing are equal to each other; that a straight line cannot inclose space, we immediately, or intuitively, recognize the truth of these statements. Attempts at proof do not make us feel surer of their truth. When we are told that every object, from a kernel of wheat to an elephant, occupies space, we do not care for proof. If we enter our room, find our wardrobe broken open, our clothing and valuables gone, we assume that their disappearance had a cause. We do not care to have any one attempt to prove to us that every finite thing must have a cause. We say that that is self-evident, or that we know the fact intuitively. We expect that a tree that bears apples this year will not produce pumpkins, foxes, or marbles next year. In other words, we expect nature to be uniform.

Barring a few exceptions, the position of these intuitive philosophers seems reasonable. They do not hold that the mind has at birth a single ready-made idea, but they maintain that the moment we perceive a certain thing, a new truth flashes into our minds — a truth not given by experience, but developed in connection with experience. Thus, when we see a train passing us, we at once know that it is passing us *now*. The "now," or concept of time, flashed on our minds the second we had definite experience. The moment we experienced the object, we knew it in a time relation, just as a young duck swims the moment it touches the water. There must be foundation truths assumed on which to build other truths. The finite mind cannot dig beneath these foundation truths, or intuitions.

Another school of psychologists holds that there are no intuitions, that what we regard as such are the products of evolution or heredity. This school likens intuition to instinct. It grants that the young duck knows water instinctively, plunges into it, and swims without learning. These psychologists believe that there was a time when this was not the case with the progenitors of the duck. They had to gain this knowledge slowly through experience. Those that learned the proper aquatic lesson survived and transmitted this knowledge, through a modified structure, to their progeny. Those that failed in the lesson perished in the struggle for existence.

As the autumn approaches, the wild goose does not reason that it ought to migrate. The approach of cold immediately develops the migratory intuition, or instinct. The tendency is already there at birth. The approach of cold merely develops the latent migratory tendency. But, it is said, there was a time when it took severe cold to drive the geese south. Many perished on the way. The same experiences were repeated in the case of the survivors and generation after generation of their descendants, until the lesson of migrating at a certain time had been gradually learned, and the structure so modified that the tendency to migrate was transmitted as an instinct to the young.

This school claims that the intuition of cause and effect arose in much the same way. Generations of human beings had seen the cause invariably joined to the effect; hence, through inseparable association came the recognition of their necessary sequence. The tendency to regard all phenomena in these relations was with steadily increasing force transmitted by the laws of heredity to posterity, until the recognition of the relationship has become an intuition.

The view that a single individual has built up all these intuitions in one lifetime by separate experiences is being abandoned. There is, without doubt, much truth in the theory of heredity, and this does not necessarily contradict the intuitive theory. If a process which was once not intuitive gradually becomes intuitive, why is it not then intuitive? The shepherd's dog that guards the lambs may have descended from the wolf, but that dog is not a wolf now. If we realize a truth now without inference, the process is intuitive, no matter what it may once have been. It may be that a luscious peach was nourished by a rank soil; but the ripe peach is not the soil. Things come to be other than the material from which they spring.

Innate Ideas. — The old belief in *innate ideas*, that is, that certain fully developed ideas are given at birth, unconnected with any experience, is untenable. Nothing more than the germ of these ideas exists in the mind. Were it not for experience, the germ would never be developed into an idea. On the one hand, rich soil and rain will never make an oak tree without an acorn to start with; on the other, an acorn will never become an oak without the soil and the rain to develop it. Some philosophers fail to understand that the germ of a thing is not the thing itself any more than an acorn is an oak; other philosophers do not appreciate the fact that in order to produce an oak, we must have an acorn at the start.

The precise limits of the extent of intuitive ideas are still a matter of dispute; it may be that some ideas now considered intuitive by many, can be shown to be due wholly to experience. It is possible that the universities of Arcturus or the Milky Way may teach neither cause nor effect. Many philosophers believe that our idea of cause

and effect is wholly due to our experience; that we can and do think something out of any relation to a cause when we think that our wills are free and are themselves the pilots of our actions. If the will is not free, if it is under the control of a cause, we must not blame a criminal for doing something that he could not help. These metaphysical arguments can be prolonged indefinitely. They may have their use in sharpening the reasoning powers.

The Intelligence of Animals.

Examples of Animal Intelligence. — Much has been learned about human intelligence by comparing it with animal intelligence. Since theorizing not based on the examination of concrete cases is valueless, let us first give some actual instances of intelligence in animals.

A man allowed a sow pig about a year old to run in his orchard. He watched her go to a young apple tree, shake it, and eat the apples that fell. Having finished these, she again shook the tree, pricked up her ears, and listened for more to drop. As none fell, she went away.

Another sow with a litter of pigs was accustomed to spend the day in a forest, returning home at night to be fed. When her pigs were of sufficient age, three were taken to roast at different times, being caught when she returned home with them. After the third had been taken, she came without the pigs. The next evening a watch was set to find out what had become of them. She would not allow them to follow her farther than the edge of the forest, but drove them back repeatedly; she then went to the house, got her own supper, and returned to them. She had evidently connected their disappearance with going to the house, and took this course to save them.

Professor Romanes writes: "I myself had a horse which was very clever at slipping his halter, after he knew that the coachman was in bed. He would then draw out the two sticks in the pipe of the oat bin, so as to let all the oats run down from the bin above upon the stable floor. Of course, he must have observed that this was the manner in which the coachman obtained the oats, and desiring to obtain them, did what he had observed to be required. Similarly, on other occasions he used to turn the water tap to obtain a drink, and pull the window cord to open the window on hot nights."

There is a well-authenticated account of a Shetland pony that had been shod once. Happening to lose a shoe, the animal went by himself to the door of the village blacksmith, and refused to leave until the missing shoe had been put on. The pony then pawed on the floor to make sure that the shoe was all right and, giving a neigh of satisfaction, cantered off home.

A man once desired to test his dog, which was lying down quietly as if asleep. In the midst of a general conversation, he inserted the words, "The cow is in the potatoes." The dog jumped up at once, dashed out to the garden, and appeared surprised not to find the cow there.

Another dog had for some time chased a rabbit which ran in a circular course to a burrow and escaped the dog. Finally, the dog, on starting the rabbit, ran immediately across the circle to the mouth of the burrow and awaited the rabbit there.

The author of *Unbeaten Tracks in Japan* writes as follows of the intelligence of Japanese crows: —

"In the inn garden I saw a dog eating a piece of carrion in the presence of several of these covetous birds. They evidently said a great deal to each other on the subject,

and now and then one or two of them tried to pull the meat away from him, which he resented. At last a big, strong crow succeeded in tearing off a piece, with which he returned to the pine where the others were congregated, and after much earnest speech, they all surrounded the dog, and the leading bird dexterously dropped the small piece of meat within reach of his mouth, when he immediately snapped at it, letting go the big piece, unwisely, for a second, on which two of the crows flew away with it to the pine, and with much fluttering and hilarity they all ate, or rather gorged it, the deceived dog looking vacant and bewildered for a moment, after which he sat under the tree and barked at them inanely.

"A gentleman told me that he saw a dog holding a piece of meat in like manner in the presence of three crows, which also vainly tried to tear it from him, and after a consultation they separated, two going as near as they dared to the meat, while the third gave the tail a bite sharp enough to make the dog turn round with a squeak, on which the other villains seized the meat, and the three fed triumphantly upon it on the top of a wall."

It is well known that some ants keep a certain species of insect, called *aphides*. These stand in precisely the same relation to ants that cows do to human beings. The aphides are regularly milked by the ants, and a sweet nutritious liquid, somewhat resembling honey, is thus secured. The ants sometimes build stables for their cows, allowing them to pasture on certain plants, and fencing the stalk of these plants in such a way that the cows cannot escape. Naturalists have repeatedly seen ants milk their cows.

Three species of ants keep other ants as slaves. The slaves tend the aphides, milk them, and often climb trees

and plants in order to find more aphides and thus increase the dairy. The slaves even put the food into the mouths of their masters. Bugs are also sometimes enslaved by ants and made to carry heavy burdens.

A man placed a broad cloth soaked in the extract of tobacco around a tree, which ants used as a pasturage for their aphides. The ants could not cross the cloth, and so they brought pellets of moist earth and built a bridge over the strip. They crossed this bridge easily and went to milk their cows. A tarred cloth was put around a tree, and some ants returning home from milking found themselves imprisoned. They ran back up the tree, brought down aphides, stuck their bodies fast in the tar, and thus formed a bridge across the strip. Ants have been seen to make a bridge across a small vessel of water. The ants might have brought earth for this bridge, but they illustrated the choice of means for ends and used instead pieces of wood or straw.

Ants have cemeteries and funeral processions. Two ants bear the corpse at the head of the procession, which follows two by two. When the first two are tired, the next pair take up the body. On arriving at the burial ground, they dig a grave, and inter the body. A lady, wishing to see a funeral, killed a number of soldier ants. She watched the procession as above described. On reaching the cemetery, six or seven of the ants refused to help dig the graves. These ants were caught, brought back, and killed at once like deserters from an army. A trench was then dug in which they were all buried together. It was observed that ants would not bury their slaves in the cemetery used for the masters. Darwin called the brain of an ant one of the most marvelous atoms of matter in the world (2).

Associational Reasoning. — When we come to investigate carefully the intelligence of animals, we find that their reasoning is principally by the association of concretes.

The dog that ran to the potato patch on hearing the expression, "The cow is in the potatoes," knew from oft association of the word "cow" with the object, that the cow needed attention. The potato field had been used in connection with a certain place so long, that the word recalled the place to the dog. The other words in the conversation were associated with nothing definite in the canine intelligence. The word "cow" brought up by ordinary association an animal with which the dog was very familiar. The word "potatoes" recalled a place. There was a union of two concrete images, a cow and a potato field.

The dog that ran direct to the mouth of the burrow and waited for his prey, instead of chasing the rabbit through a long circular course, had before followed the rabbit's path which finally led to the burrow. Repeated associations had caused the sight of the rabbit vanishing down the burrow to make such a deep impression on the dog, that when he started, the associated images ran through his mind faster than his legs could take him. The last and most powerful image of the series was the rabbit disappearing down the burrow. The dog immediately rushed straight for the place indicated by the last image, arriving there first because his associations had outrun his legs.

The pig that shook a tree to make the apples fall, had previously leaned against a tree to scratch herself. This movement was associated with the falling of apples, and both concrete ideas were associated in the pig's memory. Why the apples fell was as much of a mystery to the pig as the appearance of the jinnee was to Aladdin when he

rubbed his lamp. The two were associated, and that was enough for the pig. From the falling of apples due to the swaying of the tree in the wind, the pig would probably never have reasoned that any kind of violent motion would be accompanied with like results. Had the pig not itched, the tree would probably never have been shaken. A man would naturally have reasoned from the results due to the wind that the same would happen if the tree were shaken by his own muscles. The man would have reasoned from one instance, to another apparently dissimilar at first sight. The pig reasoned from one accidental shaking to another.

The horse had seen a movement of sticks followed by the descent of oats. The two concrete images were associated. The horse did not know why the oats fell; it was enough for him that they did fall. If the coachman had accidentally happened to pull the sticks when the horse pawed, the animal would doubtless have pawed until the fall of oats was no longer associated with that movement.

The Shetland pony had associated the shoe with the blacksmith shop. The pony's foot was probably sore, and the animal went to the blacksmith as naturally as he would have gone a second time to a place where corn had been found.

Crows had probably pecked other crows in anger and had caused them to drop food. When the pecking had once been associated with such satisfactory results, the crows would be likely to repeat it in many ways, until it came to be applied in a seemingly scientific manner to the tail of a dog.

In the case of ants the question is more difficult, because it is obscured by instincts built up ages ago under the influence of unknown causes.

There are some extremely puzzling cases of intelligence on the part of other animals. Generally, however, we may say that the reasoning of animals is due to the contiguous association of one concrete object, or set of objects, with another. This may occasionally contain the germ, but not the full flower, of human reasoning.

Improvement due to contiguous association must be accidental. This is the reason why the swallow, the robin, the crow, the lion, and the elephant have not bettered their condition from age to age. We must not forget this fact when we are puzzled with an occasional exhibition of animal intelligence.

The Higher Type of Reasoning.

Detection of Similarity amid Diversity. — There is a vast gulf between associating concrete cases with others, and reasoning from certain instances to those where the dissimilarity is the most striking point, where the similarity is seen in but one tiny thread running through fabrics otherwise as different as possible. What beast would have detected any analogy between the steam raising the lid of a teakettle and the strength of a horse, and then put the steam to do the work of the horse? What ant would have seen any similarity between the vibrations in the yielding air and the apparently unyielding telephone wire?

Human reason is characterized by applying known expedients and methods to unknown and untried cases, merely on the mental perception of similarity. The highest example of this was seen in Newton's detecting a relation between a falling apple and the moon's movements in its orbit, and then in applying the mathematical

laws deduced therefrom to every atom of matter, from a drop of water to the farthest star. The problem of the tides was an easy matter for such a mind to solve.

Professor James gives the case of a dog that went to the house and got a sponge for his master to bail out the boat. The dog was very observant and had noticed the sponge used in the same way before. If the dog could not have found the sponge, he would probably have returned with nothing. Even an ignorant man would have formed the concept of a thing capable of bailing out water, and if he could not have found the sponge, he would have brought a wooden scoop, a wash basin, a tin can, a cup, or a coffee pot. The differences in these would have been sufficiently great to bewilder the dog; but to the man's reason they would have been nearly identical for the purpose. A man might never have seen a coffee pot used to bail out a boat; yet he would have noticed at a glance that this utensil had the qualities which fitted it for the purpose. Man thus reduces stray individual phenomena and objects to classes, and brings them under general laws.

The higher type of reasoning, then, proceeds by detecting similarity amid great diversity, by applying old expedients to solve new problems. Contiguous reasoning starts from accidental associations. When the climate changed in prehistoric England, man was ready with an expedient to protect himself; the elephants and lions died.

Units of Comparison. — In all reasoning we must have certain units with which to compare the things in the world around us. These units should be well known; indeed, they must be better known than the things with which we compare them, or we gain nothing by the comparison. Knowledge consists in assimilating things un-

known to things known. Isolated facts are worth nothing. Only when facts are woven together by thought do they become valuable.

Knowledge of these units is obtained, in the first place, through perception. Where that is stinted, thought must be dwarfed. A young child familiar with a dog, on seeing a puffing locomotive, called it a "big bow-wow." The dog was the nearest comparing unit that the child had. The stars to him will, at first, be candles. When his knowledge widens, he will think of them as suns. On seeing goats for the first time, the South-Sea Islanders called them horned hogs. Horses were called large dogs. The hog and the dog were units of comparison because they were the best known quadrupeds. Unknown animals had to be assimilated to the most similar known ones. A backwoodsman traveling will often attempt, ludicrously enough, to explain the sights he sees in terms of his own stinted experience. He must proceed in this way until his experience is widened and he has more units of comparison. It was the most natural act for the rustic, sitting down to an aristocratic city dinner, to drink out of his finger bowl, in which a piece of fragrant lemon rind was floating. He had before had experience only with lemonade under that guise.

Every cultivated adult has a large number of units which his own experience has given him. In such a simple matter as comparing the sizes of two rooms, the person without a unit of comparison is lost. One room cannot be taken up and carried inside another for direct comparison. The foot-rule supplies such a unit. We find that one room is twenty feet long; the other, fifteen. We now have their lengths denoted in terms of a common unit. The eggs which the farmer barters for sugar must

first be expressed in terms of a certain unit, as must also the sugar. The eggs are worth so many cents a dozen, the sugar so many cents a pound. Steam and electrical engines are said to be of so many horse power; lights, of so many candle power.

All deductive reasoning has its well-defined units of comparison. In the syllogism, these are called the middle term. A person is found wondering whether a certain fruit grew on a tree, or on a vine, like a squash. He is informed that, —

All quinces grow on trees.
This yellow object is a quince.
It grows on a tree.

Here we have a quince = something growing on a tree. This yellow object = a quince. We see that the same unit, *quince*, is common to both equations. It is, therefore, the comparing unit, or middle term, and occupies a relation analogous to that of the foot-rule in the case of the two rooms.

Youthful perception should secure as many units of comparison as possible. Later in life, we come to regard things chiefly from the point of view in which we are interested. We shall not then be apt to hunt for new units, and we shall be very narrow unless reason can build on a broad foundation laid in youth. Men can seldom go into a new business after middle life and succeed. They have no units of comparison for that special business. Wrong machinery or unsalable stock is bought. The unit of cost of production, or of managing the business most economically, is not known in advance and is, perhaps, not found out until the capital is exhausted and the concern has failed.

Variation in Standards of Comparison. — The units of comparison are in many cases subject to change in the short life of a single individual. The standard of enjoyment varies at different times of life. The active games which appeal so strongly to youth are distasteful to age. Young persons are apt to like a florid, highly ornate style in literature. Later, the excellence of the thought receives more attention than the mere form of expression. The writers which charm youth are neglected in manhood. To a child, the standard by which to measure the highest type of enjoyment may be the delights of Christmas and the Fourth of July. Before the age of thirty, that standard will have changed.

A study of history shows that the standards by which men and morals are judged vary from age to age. The Spartan judged his children by a standard of physical excellence. If they possessed a certain unit of strength, they were allowed to live; if not, they were abandoned on a solitary mountain side to die of hunger or to be devoured by wild beasts. To-day the law imposes a moral unit of excellence to allow a man to live. If he willfully commits murder, the law prescribes death. Among some tribes the aged were regularly killed. When they fell below a standard determined by their ability to care for themselves, the father and the mother were put to death.

The Roman thought it a heinous crime to enslave a fellow Roman, but considered it right to enslave other peoples. Centuries later it was thought wrong to enslave any white man; the color then formed the unit of comparison. Later, this standard changed, and it came to be considered wrong to enslave any human being. Horses and other beasts are the only creatures which it is now thought right to enslave.

Burning heretics at the stake was once a sign of Christian zeal. It was once considered immoral to be in debt, when that condition was associated with the prison-house.

The standards by which men of our own day judge things vary from race to race and from man to man. There is nothing more variable, more changeable in its conclusions, than thought. The Eskimo's standard for determining a hot day differs from that of an inhabitant of the tropics. An object may be judged heavy by a weak man, light by a strong man. The loss of something that would not affect one person may cause another genuine suffering.

No one has any right to set himself up as a standard by which to judge the feelings of others; and yet the conceit and stupidity of human beings are such that they are always doing this very thing; their imaginations are not sufficiently cultivated for them to be able to conceive themselves environed in the same way that others are. We can even imagine beings so constituted as to be able to dwell on the sun's surface and to inhale the vapor of certain molten metals borne on the winds of flaming hydrogen, with as much pleasure as we breathe the fresh sea air in the month of August. And yet some persons feel considerable surprise, when they learn that everything in the universe cannot be measured by their yardstick.

When precisely the same facts are set before the judges of the supreme court, their opinions often disagree. The judges are all learned men, capable of grasping the import of testimony; yet dissenting opinions are frequently expressed. From one set of facts A concludes one thing, while B concludes directly the opposite. If this is the case, what reliance can be put on thought? At one time it was considered the proper course, by some doctors, to

bleed a patient, although others decided that every drop of blood ought to be saved. Some persons think a fever ought to be starved; others, that it ought to be fed. Some say that all logic points toward free trade; others, toward protection. Some declare that free silver coinage is necessary to the prosperity of a country; others are sure that the opposite is the fact.

It must be admitted that thought has no rigid boundary lines. It is fortunate that such is the case. Were the contrary true, were thought conclusions not subject to change, man could never have advanced from barbarism to civilization. An eclipse would always have been a monster seeking to devour the sun. A comet would always have portended disease and death. Men would have been satisfied with the conveyance which horses furnished. None of the great reformers would have arisen. No Columbus would have crossed the ocean. The men who have moved the world on in the line of progress, — the geniuses, — have ever thought differently from their fellows. Those countries, in which the people have been so ground down by despotism that all originality and dissimilarity of thought have been destroyed, are the least progressive.

The learned judges render a different decision on the same testimony because their experience in life has been different, and consequently the same testimony is looked at from a different point of view. When studying apperception, we saw that the same thing impressed different people in very different ways. A very little testimony, that coincides with a man's own experience, will sway him more than a vast amount which has no points of attachment to his mind. If he has children, anything affecting the status of a child will appeal to him more powerfully

than if he has none. Though false theories concerning science, government, or life may prevail for a while, yet truth is capable of fighting a long battle without tiring, and she wins in the end. The poet uttered a great truth when he sang: —

> "Yet I doubt not through the ages one increasing purpose runs,
> And the thoughts of men are widened with the process of the suns."

Belief.

Belief Emotional as well as Intellectual. — Belief is a mental state which might as well be classed under emotion as under thinking, for it combines both elements. Belief is part inference from the known to the unknown, and part feeling or emotion. Wherever the proof of anything is not absolute, but where the probability seems to our minds to be of the strongest kind, we are said to believe.

We can absolutely prove much that has occurred in the past. It is not a matter of belief, but of absolute knowledge, that a certain building was burned, that a certain man died, that it rained yesterday, that there was ice last winter. When we come to consider the future, we are thrown more on a state of belief. From the thought processes involved in comparing and inferring, we find ourselves *feeling* more or less sure that certain things will happen in the future. Ask a farmer who is sowing a certain crop if he is absolutely sure that sufficient rain will fall for the crop; and he will reply that he is not sure, but that he *believes* there will be rain.

In religious matters, men frequently say that they want absolute proof, not belief or faith. If these men acted on this principle in business life, but little business would be done by them. No national bank stock would be

bought; in fact, no investments of any kind would be made, because there could be no absolute proof that the bank would not fail or the investments not result in loss. No private individual or company would ever engage in business, because there could be no proof that the undertaking would not fail. A large amount of the world's traffic is done on credit, and that is nothing other than a belief that the debtor will pay. The morning after the first wave of a panic rolls over a country, there may not be a dollar less of money in it; but there is less confidence, trust, faith, belief, or whatever other synonymous word we may choose to apply to the mental state of the business community.

So long as the world does not stagnate, it will always act on belief in the most weighty matters, whether of religion or of business.

REFERENCES.

1. Jevons's *Lessons in Logic* is an excellent book for every one to familiarize himself with.

2. For additional examples, see Romanes's *Animal Intelligence*, which has furnished a number of the illustrations in the section.

CHAPTER IX.

THOUGHT CULTURE.

Study of Relations. — A large part of the chapters on the cultivation of the memory and the imagination was devoted to the cultivation of thought. It is impossible to train one mental power correctly without cultivating others at the same time. What has already been said in regard to thought culture need not be repeated here.

Some one has truly said that civilization is only another term for thinking. Civilization is just as much a product of thought as is an abstract quality like purity or redness. Men have always busied themselves with the study of relations, and the march of civilization has proceeded in the direction marked out by their discovery. We cannot tell how long the wool on the sheep's back appeared to the mind to be unrelated to human clothing; but we do know that man has become a master of changing climates, far in advance of the beasts. This advantage is largely due to the discovery of the comparative conductivity of heat in wool, cotton, and furs, and the relation which this variation bears to their value as clothing at different temperatures. Weaving and spinning machines are examples of the use in combination of intricately related mechanical forces.

The first practical rule for the cultivation of the thinking powers is: Be ever on the hunt for relations. The only way in which the world can advance is by finding out

new relations between things. He who discovers these new relations is a benefactor to his race. Petroleum was long unused. Its relations to light, heat, and lubrication had not been discovered. When the earth becomes well-nigh denuded of its forests and the supply of coal is exhausted, some new relations will probably be discovered between other forces in the universe. Perhaps the discovery may result in a new method of changing vibrations into heat; perhaps the wasted energy of a summer sun may be preserved and liberated in the winter; perhaps some easier way may be discovered of disuniting the hydrogen and oxygen in water, and the very ocean may be used for fuel.

The power of detecting the very first thought relation, that of *identity*, is still in its infancy. Not until recently has the identity of electricity with vibrations in the ether been discovered. The person who is on the hunt for relations under all circumstances may be sure that he is on the only royal road leading to thought culture.

Many an inventor, projector, or financier has failed, not because his schemes were not good as isolated projects, but because they were not sufficiently closely related to human needs. A so-called crank becomes ridiculous because he will not study general conditions sufficiently to see that his hobby cannot be brought into practical relations with them. No matter what a man's business is, the close study of relations is all-important for his success.

Some capitalists built a street-car line in a certain town, without sufficiently considering the number that would probably travel each day and comparing that number with the daily expenses, without reflecting on the sources of the town's growth and the direction that its expansion would take. After a struggle the company failed. It is well for

the learner to note the precise grounds of failure, to realize that it was due to lack of fully thinking out things *in their relation to other things.* There was no failure in building the line. That was perfectly feasible. Street-car lines had been built again and again. Horses or electricity could draw the cars; conductors could be found. But the expense of building and running the line did not stand in the proper relation to the number of people who would ride, nor was the direction of the line properly related to the suburban growth of the place.

The promoters of a new town built some rather expensive dwellings at the start and lost heavily on them, because the relation of the locality to the class of people who would live there had not been studied. A little reflection might have shown workingmen to be the only probable inhabitants, and they could afford only inexpensive dwellings.

Whenever one learns a new thing, apparently unrelated to any other part of his knowledge, he should make haste to form connections. In doing this, he will think.

Accuracy of Concepts. — As a foundation for thinking, it is necessary to form not only concepts, but *accurate concepts.* For instance, every person probably has some idea of chivalry. Let him ask himself to enumerate the qualities in that concept. There will probably pass before his mind knights clad in steel armor, a tournament or a battlefield, great deference to ladies, conflicts in behalf of the weak, strong castles, etc. A concept of chivalry containing only such ideas would be very faulty. A half truth may be as bad as a lie. No accurate inferences concerning chivalry could be made from such a concept. The great Edward I. of England was certainly better than the average

knight. When he and the English were fighting the French, the wounded French knights were, indeed, tenderly cared for by their enemies, but the peasants and the common foot soldiers were knocked in the head. Chivalry taught the knight to be courteous to his equals and superiors; he might treat the others as he chose. When the French king and his nobles were captured by that type of a chivalrous knight, the Black Prince, he invited them to supper and waited on his noble prisoners with his own hands. At another time, he killed off like sheep the common people in a French town. The knight repeatedly stole the crops, animals, and labor of the common people.

After one has formed an accurate concept of chivalry, he ought to be able to see how the French Revolution was its logical outcome, and how strikes to-day are sometimes due to analogous causes. He ought, then, to detect identical qualities in certain institutions of to-day. He may observe that the polite officers or stockholders in a trust may be very chivalrous to their wealthy equals; while the poor, who have been made to pay the trust's prices, may be caused actual suffering. The person who forms his concepts in this thorough way and then traces out relations between them and other concepts, is thinking, and thinking hard.

Language ready made for our memories has done much to cripple thought. No one should ever use a term without being able to form the clearest possible concept of it. "The church is built of granite." The speaker ought to be able to give a definition of granite. A definition merely sets forth the essential qualities in anything. There are persons who will speak of brass, bronze, and steel, without knowing whether they are simple metals and without

being able to define them. Such concepts of brass, bronze, and steel are not worth much. The young who allow themselves to form indefinite concepts, will not be accurate thinkers. In their old age, they will perhaps talk about psychology and metaphysics without being able to tell the difference between the two. As a practical rule, we should form a clear concept of every term; we should define it, and then we should notice all possible relations between it and other concepts.

Classification. — Whenever a person is comparing a specimen to see whether it may be put in the same class with other specimens, he is thinking. Comparison is an absolutely essential factor of thought, and classification demands comparison. The man who has not properly classified the myriad individual objects with which he has to deal must advance like a cripple. He, only, can travel with seven league boots, who has thought out the relations existing between these stray individuals and put them into their proper classes. In a minute, a business man may put his hand on any one of ten thousand letters, if they are properly classified. In the same way, the student of history, sociology, or any other branch, can, if he studies the subjects aright, have all his knowledge classified and speedily available for use.

The greatest care must be exercised in making classifications. Accurate perception and careful comparison are absolutely necessary. The science of zoölogy furnishes a striking example of important changes in classification, because the former classifications were founded upon insufficient investigation and comparison. At different periods, zoölogists have made various classifications of animals, differing in very essential particulars from the present

one, which divides all animals into eight great subkingdoms: Protozoa, consisting of the very lowest forms of animal life, many of which were formerly placed under plants; Polystomata, or sponges; Cœlenterata, or corals and polyps; Echinodermata, including jellyfishes and sea anemones; Vermes, or worms; Mollusca, including oysters, snails, etc.; Arthropoda, including lobsters, insects, etc.; and Vertebrata, including the highest forms of animal life. These subkingdoms have been formed after close examination of all known animal life, and the student now determines to which subkingdom a given specimen belongs by comparing its features with the characterizing features of the various branches. Should an animal be discovered which could not be classified under one of these subkingdoms, a new subkingdom would have to be formed for it.

The broad distinctions in this most general classification of animals instance, in a remarkable way, the great power of a thinking mind to discover the relations of identity in superficially dissimilar animals and their organs. It certainly took an unusually thoughtful mind to trace the similarity in mammals, birds, reptiles, batrachians, and fishes, and to place all these various classes of animals in the subkingdom of vertebrata; and also to see the identity between the fins of a fish, the wings of a bird, and the arms of a man.

The method of classification in zoölogy will furnish an example of how the student should go to work to classify the various phenomena which present themselves to him. He should always begin with the broad, major classifications, and proceed from them to the more narrow and specialized ones. Thus, if a certain animal is to be classified, the student should first determine to which of the eight sub-

kingdoms it belongs. Then he should proceed to the next lower group (the class), and, if the animal is a vertebrate, determine whether it is a mammal, bird, reptile, batrachian, or fish. After this, the order, family, genus, species, and variety should successively be ascertained.

It is a good plan to notice how the addition of a differentiating quality to a class further subdivides that class. For instance, a class of greater extent, plus the differentiating quality or qualities, equals a narrower class. For example: animal + a backbone = vertebrate; vertebrate + the quality of breathing by lungs + bringing forth young alive + suckling the young = mammal (class); mammal + flesh-eating = carnivore (order). The family, genus, species, and variety may be represented in like manner.

In this way, we may make our knowledge of the world more minutely exact. We cannot classify without seeing things under a new aspect.

The Search for Analogies. — In argument or reasoning we are much aided by the habit of searching for hidden resemblances. We may here use the term *analogy* in the narrower sense as a resemblance of ratios. There is analogical relation between autumnal frosts and vegetation on the one hand, and death and human life on the other. Frosts stand in the same relation to vegetation that death does to life. The detection of such a relation cultivates thought.

If we are to succeed in argument, we must develop what some call a sixth sense for the detection of such relations. Suppose the question of woman suffrage is under discussion. A woman has to pay a tax on a large tract of ground. The voters in her township meet to decide

whether a new road shall be laid out, which will cause a heavy increase in the tax rate. A man without a cent may vote; the woman cannot. Now, an analogical mind will at once remember why the Revolution broke out, and the watchword, "No taxation without representation," will be thought of. If some chivalrous men say that they, by their votes, will give what they consider fair representation to the woman, they may be reminded that the English said the same thing to the colonists; but the colonists insisted on representing themselves. If an opponent abandons that phase of the argument, but insists that woman's suffrage was tried somewhere for two years without proving a glittering success, another search must be made for analogous instances. An apprentice in learning how to use tools cannot be expected to use them well at first. Almost all revolutions have been immediately followed by a worse state of affairs.

John Stuart Mill, in his essay on *The Subjection of Women*, deals the strongest blows from analogy. If it is said that the various professions ought not to be thrown open to women because they are unfitted for them, the reply is that a law ought then to be passed deterring men from employing a blacksmith with a weak right arm. If it is objected that such a law would be silly, for natural competition would exclude such a blacksmith, the retort is that a law keeping woman out of any of the professions is silly, for if she is not fitted for them competition will drive her out. If it is urged that she will become fitted at the expense of feminine qualities, the reply is that nature is powerful enough to attend to that without artificial restrictions. A cat may be fond of fish, but it is unnecessary to fence in the ponds for fear the cats will rush in and either drown themselves or usurp the sphere of ducks. The

feline nature is strong enough to keep the cat where it belongs. Exceptions to the rule will perish without exerting any lasting influence.

Many false analogies are manufactured, and it is excellent thought training to expose them. The majority of people think so little that they swallow false analogies just as newly fledged robins swallow small stones dropped into their open mouths. An American wrote home from abroad that our country was much richer than England and might just as well as not have roads as excellent as those in England. His remarks were widely applauded by the unthinking. England is about the size of Alabama. If the United States occupied an area proportionately small to her population, she could have equally good roads. If she had them now over her broad domains, her people would stagger under a debt that would incapacitate them for other things. If a person said we were arguing that we should not have better roads, he would be incapable of apprehending the relation of identity; for that is not the principle involved in the discussion.

This tendency to think as others do must be resisted somewhere along the line, or there can be no progress. When Dr. Johnson was asked if a great prose writer could also be a great poet, the Doctor replied: "Certainly; a man can walk as far east as west." The analogy is false. The same muscular movements will enable a man to walk in either direction; the same faculty will not enable him to write both prose and poetry.

The study of poetry may be made very serviceable in detecting analogies and cultivating the reasoning powers. When the poet brings clearly to mind the change due to death, using as an illustration the caterpillar body transformed into the butterfly spirit, moving with winged ease

over flowering meadows, he is cultivating our apprehension of relations, none the less valuable because they are beautiful.

Breadth of Thought Culture. — Success in this complex world demands breadth of thought. When we come to engage in active work, our mental force will probably be almost entirely concentrated upon it. If a broad foundation is not laid early, it will never be obtained; for the cares of life put us in a treadmill; they may permit us to think on foundations already laid, but we shall be allowed to build no new ones. We shall then think in ruts; and it will be well if they extend in many different directions.

Some of the most eminent practitioners of medicine have said that it is dangerous for patients to go to a specialist at first, because he is apt to see in them the complaint which he treats, and not see the remote cause of the complaint. The best specialists are those who have acquired wide experience in general practice, for then they can take a broader view of the field of disease. If a student entered a professional school at once, instead of going through college, he would not have laid the foundations for broad thinking. A lawyer trained to think to the thirty-two points of the compass will often scent danger, and see points invisible to the less cultivated, which will enable him to win cases. A business man who has a general knowledge of affairs will detect a flaw in an enterprise *before* he has invested, and not, like the majority, see the flaw too late.

A man of wide culture and experience said that he had learned that men skilled merely in their own profession needed close supervision. He invariably remained to watch plumbers, carpenters, and other mechanics engaged

upon his house. They were accustomed to thinking in such a narrow rut that he was often able, from apprehending broader relations, to tell them how to do their work better, or why a certain plan would not be practical. He said that he had found that even a plumber was worth double wages, if he was a broad thinker. This cultivated man was a college graduate; and, though a business man, he declared that all his knowledge, from chemistry and physics on the one hand, to political economy and psychology on the other, enabled him to conduct his business more successfully.

It has often been said that to know one thing thoroughly would be to know the entire universe, for everything has either direct or indirect relations to all other things. One thing never means anything except in relation to other things, and the more various its relations, the more it means to us. Mr. Gladstone made a better statesman because his diverse knowledge enabled him to see all sides of a question. The *Iliad* and the *Odyssey*, which he studied so carefully, seem a long way from the science of modern government, yet he obtained many helpful hints from them. There is always an educating relation between any two things, if a mind is acute enough to perceive it. Such an intellect can mine gold anywhere.

Thought Culture and Individuality. — There are many persons to whom the epithets, "fickle" and "rattle-brained," are very properly applied. An idea on any one subject is never detained in their minds long enough for them to become acquainted with it. No one ever knows how to forecast their conduct, because no one can foretell what dominant idea will happen to control them at any given time. Stability of characte is erected on a foundation of

definite thought. To secure this, does not require one to tie himself down for life to a single idea or subject; but he must study whatever he takes up, until he has firmly grasped its relations to other subjects.

Fickleness is the great enemy of thought culture, and of a knowledge of self. The ideas in the minds of many change so often that they have no consecutive and determinate self; in consequence, no one, not even themselves, can place dependence upon their actions in any given case.

Effect of Novel Reading on Thought. — For proper nutrition, it is necessary that food should remain a certain length of time in the stomach. Digestion, mental or physical, takes time. Ideas must be kept in the mind until their relations to other ideas can be thought out. No mental nutriment can be received from them if they pass through the mind at a galloping pace. In our study of memory, we saw that rapidly skimming over a subject to pass an examination brought no permanent results, because things did not stay long enough before the mind for it to connect them to other things by their relations. Acquisitions of this sort speedily pass out of the mind.

The rapid devouring of novels is fatal to thought. No idea is allowed to linger; the mind rushes on from one exciting scene to another in as quick succession as possible. ever calling for more excitement. One novel is finished and another begun. No time is left for perfect digestion. The circulation of many general libraries averages eighty per cent of fiction. They deserve to be known as aiders and abettors in killing thought. The minds of inveterate novel readers are apt soon to become so unsuited to severe thought, that they regard it with as much aversion as a rheumatic person does a foot race.

How Fiction May Serve to Cultivate Thought. — Since fiction is certain to be widely read, it is important to know how it may be made to cultivate the thinking powers. If persons would read a novel with the same care as a history, as much mental discipline might result. Every move of the character in fiction ought to be compared with actions in real life. Would real persons develop new emotions and change old ones as quickly and for the same reasons as those on the printed page? The principle of *comparison* between the fictitious and the real may be brought in at every step. Thought consists essentially in comparing, in noting likenesses and differences; and it cannot be repeated too often that all mental exercise of this sort tends to cultivate thought in the only true way.

Again, after finishing one chapter, the reader ought to endeavor to forecast the following chapter. When the hero and heroine are plunged into difficulties, or the action seems in general to be taking the wrong course, the reader should lay down his book and ask himself how he would set things right, how he would avoid a certain catastrophe. By so doing, he will develop the power of constructive thought. This practice would serve him in good stead in the actual difficulties of his own life. He would think his way out of trouble quicker. When he found himself in a corner, his nimble-witted mind might suggest several alternatives of escape, while one who had not thus trained his thinking power might see no way out until too late. Many a lawyer, doctor, business man, has said to himself: "If I could only have seen that other alternative before the case was lost, the patient dead, the enterprise ruined."

It would be considerable trouble to read a novel in the way indicated, to forecast each chapter, and to devise as

many ways as possible of unraveling the plot; but the results would be worth the trouble. It is always more work to mine gold than coal. If one who has read his fiction in this way will go out into the world and keep up such practice when confronted with real difficulties, he will forge ahead of those companions who started with the same ability. This world demands for success not only plenty of thought, but quickness of thought. More than half the world thinks after it is too late. How often do we hear people exclaiming, "I wish I had thought of that in season." One ought not to expect to do anything quickly without special practice in that direction. Even the hands will not move nimbly over the piano keys without frequent practice.

The novels of Scott, Dickens, Reade, Collins, are, many of them, no less remarkable for their insight into human nature than for the ingenuity of their plots. In these they are immeasurably superior to the majority of later writers. These older authors will furnish plenty of material for the exercise of constructive thought. When one wishes to study the evolution of human character in its various phases, and to compare the development indicated by the author, with the course of such development in actual life, he will find the novels of Thackeray, Hawthorne, and George Eliot superior for that purpose. Let the student read *Vanity Fair* and then write an essay on the development of Becky Sharp's character and compare it with Amelia Sedley's. After finishing *Romola*, let him trace the growth of the differing emotions in the leading characters and institute close comparison between them, noting the likenesses and the differences. If studied as we have indicated, fiction will, in its own way, be as serviceable as mathematics for training thought.

Influence of Thought Culture on Character. — The cause of morals has no more powerful aid than the thinking faculty. Many persons are selfishly inconsiderate, and cause a great deal of trouble simply because they do not think. They are surprised when the results of their thoughtlessness are laid clearly before them. Of course it is possible to think in order to be more rascally; but the deepest thought has ever shown that the influence of the great moral laws lies in the direction of human good; and history has shown, in the destruction of vast empires and the backward steps in the march of progress, that neglect of those laws is followed by disastrous consequences. Animals have been treated better since man was led to reflect carefully on their condition.

Consistency has been called a jewel, and it is a gem not worn by the thoughtless. Consistency demands careful thought, the comparison of one's present with one's past conduct, and of one's self with others. Again, persons often blame another for a course of action; when a like circumstance arises later, it finds them guilty of perhaps worse deeds. Thoughtless people daily complain of a mote in the eye of another, when there is a beam in their own.

An officer and stockholder in a trust criticised Napoleon severely for selfishness and unscrupulousness in attaining his own ends. The director of that trust had sought every means to drive competitors to the wall. He had succeeded in placing his iron heel on the neck of consumers and of workmen. He had striven as unscrupulously as Napoleon to make his trust absolute in power. The mosquito was calling the lion bloodthirsty.

Men belonging to labor trusts object to other trusts. These men band together to keep the price of labor high and to restrain any competing laborer from working. He

may need to work for his starving children, but the labor trust menaces his life and limb if he attempts to mine coal, to handle freight, or to take the place of one who has left his position.

Those who have not been early trained to see all sides of a question are apt to be extremely narrow, and undesirable to live with. Whenever one finds himself blaming other persons, he ought immediately to recall his own acts for comparison, and see if none of them is in like manner blameworthy. By discovering the relation of identity in this way, the thinking and the moral faculties will receive some of their very best training.

Value of Special Studies. — So far as thought cultivation is concerned, it makes far more difference how a subject is studied than what the subject is. The study of Shakespeare, or any good literature, will serve as well as mathematics, if the student is careful to form accurate concepts of every term, to link these logically together, and to note all points of attachment of new knowledge to old. Special studies tend to cultivate one in noting special relations only. As before said, this narrowness may be avoided by not specializing too early in life.

Time for Thought Culture. — In recent years the tendency has been to force the detection of obscure abstract relations upon children at too early an age. A young man was heard to say with considerable bitterness: "My instructors compelled me to misuse my time doubly. When I should have been perceiving and memorizing, they worried me with difficult thinking. Now, when I should be thinking, I have to spend my time perceiving and memorizing to get something in my mind to think about.

Memory work would have been fourfold easier for me then; thinking is tenfold easier for me now."

In early life the detection of only the more evident thought relations in perceived objects, geography, history, and language, should be expected. Nature did not blunder in making the faculties of perception and memory the most active in youth. Deep thinking must not be required until later. Sir Walter Scott says that he, early in life, amassed a vast amount of facts connected by no deep thought relations. He likens himself at that time to a man with a good hand of cards, who neither knew their value nor how to play them. Later he learned how to play them with effect. Some persons would have spent all their energy in learning how to play, and then they would have had no cards. On the other hand, it must not be forgotten that Scott's knowledge would have been of no use to him, had he not afterwards woven it together with thought relations.

CHAPTER X.

FEELING AND EMOTION.

General Aspect of Affective Mental States.

Feeling. — Feeling may be defined as the simple agreeable or disagreeable side of any mental state. We can interpret feeling only in terms of our own conscious experience. If we have never felt pleasure, pain, fear, or sorrow, a quarto volume cannot make us understand what such a mental state is.

Some psychologists claim that there are states of mind absolutely neutral in regard to pleasurable or painful feeling, that we can feel when the feeling is neither agreeable nor disagreeable. Others think that feeling devoid of all pleasure or pain would resemble the play of *Hamlet* with Hamlet left out. If there are perfectly neutral feelings, they incite to nothing; hence we may pass them by hurriedly in a practical world of action.

Difference between Sensation and Feeling. — So complicated and interwoven are all the mental powers, that it is difficult to isolate them for a clear view. Practical experiment has, however, shown that when a corn was touched with a stick, the tactile sensation was present in consciousness from one to two seconds before the feeling of pain. A psychologist, with his hands folded behind him, was standing near a stove. As he stepped backward, he came in contact with it, and he had the sensation of

touch an appreciable time before he felt pain. The sensational factor enters into states of knowledge; that of feeling, into emotion.

There is a second marked way in which we can distinguish sensation and feeling. By practice we assign our sensations to things external to ourselves. We place the color in the apple, not in our eye or mind. If some one in a fit of passion throws an apple at me and causes me pain, I cannot put the feeling in the apple. The feeling is my own internal, subjective state. The sensation seems more external and objective. The apple might be there if we were not there to view it; not so the feeling. My feelings belong to me; but my sensations seem to belong to the object which caused them.

Importance of Feeling. — The phenomena of the world have value for us only in so far as they affect our feelings. If a thing fails to interest us, that is, fails to touch our feelings at any point, we pass that thing by unheeded. Much of what people say to us passes in at one ear and out at the other; but if we are told of the death of a parent, the effect of the announcement may never pass away. Our feelings have been touched, and we shall never again be the same persons. A studied insult or a signal triumph affects us more powerfully than many other things, only because it appeals more deeply to feeling. Decisions in this world are generally, at last, made at the bar of feeling. It is a severer impeachment to say that a person outrages our feelings than that he is illogical.

How Feelings Differ. — Feeling is the most illusive and changeable of all the mental powers. In this it resembles the classical Proteus, or the clouds at sunset. Neverthe-

less, feeling has certain prominent characteristics which serve to mark its varied changes.

Feelings differ (1) in *quality*, (2) in *intensity*, and (3) according to whether they attach themselves to *changing bodily states* or to *ideas*.

Quality of Feelings. — The first attribute of feeling to force itself on our attention is a pleasurable or painful quality. The moment that quinine is placed upon the tongue, the bitter taste is painful to most of us. In connection with a sensation from candy or some choice fruit, we experience a feeling of pleasure. Life is largely a struggle to secure a pleasurable quality in feeling and to rush away from a painful attribute. Almost any one will go to a window to look at a bright rainbow, because it gives him pleasure. We do not look straight at the sun because we wish to avoid a painful feeling. Many of us dislike to see ulcers or deformity for the same reason.

In addition to the pleasurable or painful element, some would say that feeling was distinguished by another quality, — that of neutrality, of the absence of either pleasure or pain. It is said that when we are sitting in our chairs, we often experience neither pleasure nor pain; that when we are slightly surprised, the feeling may be neutral. The mere fact that this is a disputed point shows that such feelings are not obtrusive. If there are such, they will never become powerful motive factors in our conscious lives.

Pleasure and pain are such important characteristics that we must consider them at greater length.

Relation of Nervous Action to Pleasure and Pain. — Whenever the nervous system has stored force, or a sur-

plus of energy, at its disposal, pleasure results from working this off in a normal way. There is also pleasure in recuperation, or in accumulating nervous force up to a certain degree.

Youthful muscles and nerve cells are repositories of force. The young resort to games in which muscular activity is the most prominent feature, because working off this surplus energy results in pleasure. When one is tired, pleasure comes from merely sitting down to rest. Force begins to accumulate, and contrast is here efficient in causing a pleasurable glow of feeling. Contrast draws the attention elsewhere, and thereby involves the use of force stored in some other part of the nervous system; hence a new kind of pleasure is coincident with working off this different surplus. Whenever the nervous system is stimulated to action which calls for more than the surplus force, pain results. Pain also follows the lack of a proper outlet for this stored force.

If we keep on walking after the muscles are fatigued, they will pain us. Make any one sit still without exercise for a considerable period, and pain will result because the stored nervous force, like water running against a milldam, demands outlet. This pain will be severe in proportion to the potential energy. It will be much more irksome for a child than for an older person to sit still. This stored force gorges the system, forcing certain parts to overwork, to make amends for lack of outlet. This overwork causes pain in special parts of the nervous system after their stored force has been expended in trying to keep the repressed energy within normal bounds.

Dissipation of any kind, which breaks down nerve tissue faster than it is built up, is certain to result in pain. On the other hand, mentally initiated emotions, such as worry,

fear, and grief, have broken down brain cells and sent persons to the insane asylum.

Physiological chemistry has proved that mental work is accompanied by nervous waste, and that there must be periods of repose to supply this waste. After any of the pronounced mental emotions, this waste is especially apparent. Two eminent physiologists unite in saying: "From various considerations it is certain that pain is always the result of a change in the nerve cells of the brain." It must be remembered that pain initiated by purely mental causes reacts on brain cells and tends to weaken them, while mental pleasure involves the use of stored nerve energy.

Even the most complex states of feeling and ideal emotion are profoundly modified by nervous action. If it could be shown that they were ever started by an idea without the aid of a nerve cell, they would yet depend on the nervous system for the prolongation of their states. When the nerves were utterly exhausted, they would no longer respond to the idea, and fainting or unconsciousness might ensue. Asceticism taught the neglect of the body. The physiological psychology of the emotions commands its most careful nurture.

Change of Pleasure into Pain and of Pain into Pleasure. — We have seen that pleasure accompanies the expenditure of potential nervous energy. Since all finite energy is limited in amount, the fountain finally becomes exhausted. If actions involving further expenditure are persisted in, there is pain. Indulgence in any pleasurable action beyond the limit of this stored force is followed by pain.

The converse is not true, — that painful action beyond a certain limit will bring pleasure; hence, pain seems to

have the advantage. There is, however, a truth that we must not overlook: Our pleasures in many cases are the result of preceding painful or disagreeable action. If we push activity slightly beyond the point where pleasure ceases and pain makes its appearance, we shall find that the nervous system has an inherent power of growth, or of enlarging its storage facilities. A slight degree of pain is often a necessary antecedent to that growth. In this way pleasure extends its boundary lines, for the increased growth affords additional pleasure. Suppose a boy finds pleasure in pulling himself overhand up eight rounds of a ladder. If he does not pass beyond this point, he will not develop his possibilities. Let him take ten rounds to-day, and he will soon find that his capacity for additional pleasurable exertion has increased. He may come to ascend thirty rounds without a feeling of pain. The entrance to most studies is attended with painful labor; but after a while they become sources of positive pleasure. It has been well said that acquired tastes are so many acquired ways of getting pleasure from things which were once distasteful. Raw oysters, tomatoes, and pickled olives are physical instances. Many studies furnish mental illustrations.

Effect of Pronounced Pains upon the Nervous System. — After what has been said in the preceding section, the caution should be given that although pain may be sometimes necessary, it is to be viewed only in the light of a necessary evil, or as a warning that we are beginning to overstep the bounds of proper exercise. Pain tends to break down and disintegrate the nerve cells in the brain, and to render the sufferer unfit to do his best in any line of work. Physicians tell us that the painful element in

emotions is a potent factor in destroying the integrity of the nervous system and in permanently impairing the health. Grant Allen makes a statement in the main true, when he says: "Pain is the subjective concomitant of destructive action or insufficient nutrition in any sentient tissue."

When we consider the long and dark pathway which human beings have trod, we can see why the survival of the race demanded pleasure and pain as primitive psychical elements. When man was barbarous, he frequently had only pleasurable feelings to tell him what course to take, while painful ones warned him what path to shun. Pain and pleasure are probably the first elements that stand out most distinctly and forcibly in the infant's consciousness. The child does not have to learn what pleasure and pain are. It is not necessary to teach him that a burn is painful. Had pleasure and pain not been the most emphatic parts of the earliest human experience, the race would have perished.

Intensity of Feeling. — There is a quantitative as well as a qualitative difference in feeling. The discomfort from the bite of a mosquito is not so massive as the pain from a large bruise or a broken limb. Any boy would say that a heaping teaspoonful of ice cream would give him more pleasure than an amount the size of a pea. Within certain narrow limits, the intensity of the feeling is proportional to the intensity of the stimulus.

One of the most important factors in changing the intensity of feeling is the duration of the stimulus. A continued stimulus of the same kind soon dulls nervous sensibility. This is regained in full measure only when the stimulus is changed or intermitted for a time. The noise

in a cooperage or boiler-maker's shop is almost distracting for a while, but the workmen soon cease to mind the din. On entering an apothecary's shop, we observe a characteristic odor, but the clerks do not notice it. Nervous energy for any kind of response is limited. If the stimulation is continuous, the response must become gradually less energetic. Before vigor can be restored, there must be a period of rest sufficient to build up the impaired tissue. We may even say with Höffding: "No constant state, but only a change effected with a certain suddenness, calls to life a nerve process. . . . By a very gradual increase or decrease of temperature, a frog may be boiled or frozen to death without making the smallest movement."

Sense Feelings Contrasted with Ideal Feelings. — Feelings rise in two ways: (1) A *peripheral excitation* — for instance, the sting of a bee — results in a pronounced feeling of pain. The sight of autumnal foliage, the sound of a melody, a caressing touch, may furnish cases where simple nerve pleasure is the most pronounced element. Of course these must affect the mind before conscious pleasure can be felt, and so in that sense the feeling may be called mental; but the pleasure is the result of immediate external stimulation of some sense organ. Not only the special senses, but any vital organ, muscle, or nerve may be the cause of feeling.

(2) Feelings may be caused by an *idea*. The remembrance of an insult, of an act of unkindness, of a wrong done, may cause acute feeling. The memory of his dead mother's face caused the stolid Nero pain. There may be no immediately preceding change in the sense organ when an idea flashes into the mind, but the feeling may be just as pronounced as if there were. Shakespeare classified the

feelings as the sensuous and the ideal, when he represented the pain inflicted by the wintry wind less severe than the memory of man's ingratitude.

At the same time the ideal feelings rest indirectly on sensory foundations. A representative idea is a revived sensation, or a complex of revived sensations. A presentative idea is a compound of the intellectual factors of sensation and of feeling. When we plunge the hand into very hot water, we have first a tactile sensation of something denser than air, and, second, a feeling of pain. Probably the same brain tract that figured in the original sensation is active in memory. The reawakened action in the same nerve cells would reproduce the feeling as well as the sensation, with varying degrees of distinctness. Shakespeare voiced the most advanced psychology, when he had Macbeth doubtfully ask the doctor whether he could

> "Pluck from the memory a rooted sorrow,
> Raze out the *written troubles of the brain*."

Feelings Differ Qualitatively and Quantitatively According to the Idea. — It is plain that some ideas cause a joyful, others a sorrowful, mental state, and that joy and sorrow differ in the quality of feeling. As we read the pages of *David Copperfield* or *Oliver Twist*, the constantly changing ideas usher in the emotions of joy, fear, love, anger, sympathy, and the feeling element in each of these emotions is qualitatively different. When little Oliver Twist is stolen from his kind benefactor and taken to a den of thieves; when he is made to accompany them on a housebreaking expedition; when he is left insensible with an arm mangled by a pistol shot; when he weakly totters back to the house where he was compelled to make the attempt at robbery; when a woman standing by the bed-

side of the little sleeping sufferer lets fall upon his face a tear, which causes a smile to appear as if he were dreaming of his mother, — we are conscious that our feelings differ in quality as the ideas change.

The following example will show how ideas may cause feelings to vary quantitatively. If, as we look out of our window, we see a child run over, our feeling will change in quantity according as we form an idea that the child has been killed, that one of his limbs has been torn off, or that he has escaped with only a few scratches. Our feeling always varies quantitatively according as the idea has a more or less pleasurable or painful element.

The Rise and the Decline of Feeling. — There are two factors which determine the rise and the decline of feeling: (1) Feeling will increase up to a given point in proportion to the intensity of the stimuli acting upon the nerves. We have already seen that we may class ideas among such stimuli, for they affect the nerves powerfully, and they perpetuate states of feeling. When the nerve cells have used up their stored energy, the feeling of pleasure ceases. Pain then increases until the activity of the nerve for this kind of response is exhausted. In both cases, feelings are circumscribed by the inability of nerve matter to continue to respond, with equal intensity, to the same stimulus for an indefinite length of time. The victim on the rack becomes more callous to pains. The pampered child no longer finds pleasure in the same luxuries.

(2) Attention of the same intensity cannot be centered upon the same stimuli for a great length of time. Feeling will increase as we attend to it, and it will decline as we center our attention elsewhere. Brain cells are active in attention. As the energy at their disposal is limited,

attention centered upon the same sensation or idea will grow less and less vigorous and the connected feeling will proportionally decline.

EMOTION.

Difference between Emotion and Feeling. — An emotion is the complex agreeable or disagreeable side of any complete mental state. We have already seen that feeling is the simple agreeable or disagreeable side of any mental activity.

This distinction between emotion and feeling emphasizes the fact that feeling is a simple, primitive, mental state, just as sensation is. We can feel as soon as we enter on existence. Emotion, like perception, is a more complex and complete mental state, and it demands the presence of a representative idea to guide and prolong it. On the other hand, feeling may rise from a bodily cause and may be preceded or accompanied by no distinct idea.

Feeling is present in all emotional states. It is a thread on which all other states are strung like beads. When representative ideas appear, the feeling in combination with them produces emotion. After the waters of the Missouri combine with another stream, they receive a different name, although they flow on toward the Gulf in as great volume as before. Suppose we liken the feelings due to sensation to the Missouri River; the train of representative ideas to the Mississippi before its junction with the Missouri. Emotion may then be likened to the Mississippi after its junction — after feeling has combined with representative ideas. The emotional stream will now be broader and deeper than before. This analogy is em-

ployed only to make the distinction clearer. The student must remember that mental powers are never actually as distinct as two rivers before their union.

Any novice in psychology can see the difference in the mental state induced by a burn and by the news of the death of a friend. In the former case feeling starts from injured nerves; in the latter, emotion rises from an idea, which reacts upon the body and causes new feelings.

The student must beware of thinking that we have done with feeling when we consider emotion. Just as the waters of the Missouri flow on until they reach the Gulf, so does feeling run through every emotional state.

Reflected Waves of Bodily Feeling are Important Factors in Emotion. — Emotions differ from feelings not only in complexity caused by trains of representative ideas, but in waves of bodily feeling caused by those ideas; the results of these waves are reflected back upon the mind, and contribute new elements of feeling to render the emotional state still more complex.

Suppose a person has offered an insult to us. We recall it; we think about our own actions to see if they justified it; we remember that he is indebted to us for a former favor. The mental state has become complex, and the emotion of anger begins to rise; but it will not be complete until it has found expression in some of the bodily organs. There is a scowl on the brow, a compression of the lips, a muscular tension in the hands, a quickened heart beat. If these bodily changes arose without any idea, their effects would be transmitted to the mind, and we should have feeling as a result. Now, the results of this activity in frowning, muscular tension, and expression are reflected back upon a mind in which

the emotion of anger is developing. The feeling from this reflected wave is the factor necessary to complete the emotion.

If we watch a person growing angry, we shall see the emotion increase as he talks loud, frowns deeply, clenches his fists, and gesticulates wildly. Each expression of his passion is reflected back upon the original anger and adds fuel to the fire. If he resolutely inhibits the muscular expression of his anger, it will not attain great intensity, and it will soon die a quiet death. So important is this wave of expressive muscular feeling dashing back upon the inducing mental state, that some have erroneously concluded that an emotion did not *begin* to rise until the sensations from the muscular expression of the idea were reflected back on consciousness.

Expression of Emotion. — All the emotions have well-defined muscular expression. Darwin has written an excellent work, entitled, *The Expression of the Emotions in Man and Animals*, to which students must refer for a detailed account of such expression. A very few examples must suffice here.

"In all the exhilarating emotions, the eyebrows, the eyelids, the nostrils, and the angles of the mouth are raised. In the depressing passions it is the reverse." This general statement conveys so much truth, that a careful observer can read a large part of the history of a human being written in the face. For this reason many phrenologists have wisely turned physiognomists. Grief is expressed by raising the inner ends of the eyebrows, drawing down the corners of the mouth, and transversely wrinkling the middle part of the forehead. In Tierra del Fuego, a party of natives conveyed to Darwin the idea that a certain man

was low-spirited, by pulling down their cheeks in order to make their faces long.

Joy is expressed by drawing backward and upward the corners of the mouth. The upper lip rises and draws the cheeks upward, forming wrinkles under the eyes. The elevation of the upper lip and the nostrils expresses contempt. A skillful observer can frequently tell if one person admires another. In this case the eyebrows are raised, disclosing a brightening eye and a relaxed expression; sometimes a gentle smile plays about the mouth. Blushing is merely the physical expression of certain emotions. We notice the expression of emotion more in the countenance, because the effects are there most plainly visible; but the muscles of the entire body, the vital organs, and the viscera, are also vehicles of expression.

Emotion Produced by Bodily Expression. — Actors have frequently testified to the fact that emotion will arise if they go through the appropriate muscular movements. In talking to a character on the stage, if they clench the fist and frown, they often find themselves becoming really angry; if they start with counterfeit laughter, they find themselves growing cheerful. A German professor says that he cannot walk with a schoolgirl's mincing step and air without feeling frivolous. A study of hypnotic subjects has shown that emotion will often rise with them, if they are placed in the proper attitude. If made to kneel and clasp their hands, a devout frame of mind follows.

Bodily Expression Prolongs Emotion. — After the idea which has caused fear is seen to be groundless, the emotion still persists. Fear has caused changes in the vital organs and the muscles and these changes continue to

affect the brain and prolong the fear after the departure of the idea, just as the waves of the ocean continue to dash high upon the shore long after the wind has ceased. After burglars have broken into a house, there is generally no more sleep for the inmates that night, although the house may be guarded well enough to dispel the idea that another attack will be made. Waves from affected physical organs dash upon the brain and prolong the fear.

Not without reason are those persons called cold-blooded, who habitually restrain as far as possible the expression of emotion; who never frown or throw any feeling into their tones, even when a wrong inflicted upon some one demands aggressive measures. There is here no wave of bodily expression to flow back and augment the emotional state.

Classification of the Emotions.

Difficulty of Classification. — So complex are the emotions, that a satisfactory classification of them has never been made. But some attempt at classification is desirable in order that we may view emotion from different sides, and learn something additional from each view. Professor James rightly says: "Any classification of the emotions is seen to be as true and as natural as any other, if it only serves some purpose." We shall endeavor to give the simplest classification that will afford a broad view of emotional activity.

No one of these classes will exclude other classes. The mind is a unit, and all that classification can do is to view this unitary activity from different sides. The distinction between feeling and emotion is not absolute. There is more complexity in the emotion, but precisely where the necessary complexity begins, no one can say. Hence

there is some reason for the popular use of feeling and emotion as synonyms. A glorious cathedral should be viewed from as many different sides as possible; but we must not forget that it is the same cathedral, no matter how different the points of view.

Scheme of Classification. — We have already classified as *feeling* those simple states due either to peripheral stimulation, such as a burn, or to the simple memory of that burn. Taking *emotion* as starting from a complex representative idea, as the memory of a mother's past kindness or the constructive image of future success, we may proceed to classify as follows: —

I. *Egoistic emotion, e.g.* pride. This emotion starts from any idea that represents the welfare of the self.

II. *Altruistic emotion, e.g.* sympathy. This rises with an idea that suggests the welfare of others.

III. *Intellectual emotion.* This accompanies the working of any intellectual power — perception, memory, imagination, or thought.

IV. *Æsthetic emotion.* This takes its rise from the contemplation of beautiful objects.

V. *Moral emotion.* This attends ideas of certain relations of human beings to each other; or, in other words, ideas of right and wrong courses of human action.

Further investigation of emotion along these lines will give us a better idea of it. We must not forget that these divisions sometimes overlap. Altruistic emotion has egoistic factors; both classes are intellectual, since they arise from apprehending ideas in their relations. Æsthetic and moral emotion also have an intellectual side, since a cultivated mind alone can have these emotions to the fullest extent. There are, however, ample

grounds for making such a classification, since it emphasizes the fact that emotional life is many-sided with a common element running through it.

Egoistic Emotion.

The Selfish Side of Emotion. — Egoistic emotions cluster around anything that affects the self directly or indirectly. Pride, jealousy, love of approbation, fear and anger when anything threatens the self, are egoistic emotions. In short, any movement prompted by a desire for self-advancement or to escape harm is due to egoistic emotion.

In the evolution of the race, the egoistic emotions were absolutely necessary for the survival of the individual. They are so to-day in a somewhat less degree. The truth of this is indicated in the popular saying, "If you don't look out for yourself, you must not expect any one else to look out for you." It is also said that Heaven will not help a man unless he helps himself, or, in other words, unless his egoistic emotions prompt him to a certain amount of action. In the early history of the world, those tribes who could not, or would not, protect their property, their wives and children, perished. It is necessary to-day for the individual to have enough egoistic feeling to get for himself sufficient money to shelter, feed, clothe, and otherwise care for himself and his family. If he has not, he and they will go to the wall.

The egoistic emotions are sufficiently instinctive and universal to need little culture. Once in a great while we meet with some one who will, for the mere asking, give up to others almost anything he has, who is always neglecting his own interests and those of his family to help some one else; but he is a rare specimen. To-day men more

frequently fail in life from selfishness than from practicing altruism. The Indian lost his broad lands more from lack of altruistic than of selfish motives. He was too often at war with other tribes, too revengeful, and his sympathies were too narrow.

Similar Actions by Ourselves and Others Arouse Different Egoistic Emotions. — Our own actions do not raise in us the same kind of feeling as similar actions on the part of others. We condemn certain acts in others, but perform similar acts without feeling a particle of indignation. Most persons have, at some time or other, been told things *in confidence* and have repeated the confidence to some other person. When such untrustworthy persons have had their own confidences violated they have been angry; but there is no trace of anger at their own breach of trust. Amusing as it seems, nothing is more common than to hear a person say before he breaks the confidence reposed in him: "That was told me *in confidence*." The workingman is indignant at trusts. He forms a labor trust himself, and endeavors to control the whole supply; but he experiences no feeling of indignation at his own acts.

This difference in feeling is a relic of barbarous times. We are not yet fully evolved; or, as a humorist expresses it, we are still half frog and half tadpole. A primeval man went to a cave on the opposite side of a mountain from his own, killed the wife and children and took the goods of another man. As time went on, tribes did the same thing. Even these barbarians would have acknowledged that they would have felt wretched at similar treatment. If asked why they did not have the same feelings when inflicting it on others, they would have replied that their victims would have killed them if

they could; that it was merely a question which was to survive. As aboriginal society was constituted, there would have been considerable truth in the reply; but in the present condition of government, there is little. If one person fails to do an objectionable deed, it by no means follows that some one else will do it. In proof of this, as the years roll on, men are coming more and more nearly to look at their own deeds in the same light in which others regard them. Education and the consequent improvement in the imagination and the reflective powers are bringing this about at a rapid rate.

Altruistic Emotion.

Conditions of Sympathetic Emotion. — We have emotions which cluster about the welfare of others. Every time we are sorry at another's misfortune, or filled with joy at his success, we experience an altruistic emotion.

The complex altruistic emotion of sympathy is the noblest feeling given to mortals. Its possession renders a human being more attractive than all other qualities combined. There are four distinct steps necessary for the full growth of sympathy:—

(1) The sympathizer must be a good observer. He must be on the alert to notice any cause capable of producing grief or joy. He must be careful to detect the physical expression of emotion, even when efforts for its repression or concealment are made. Pride or shyness or fear causes many a human being to mask the emotions, even when sympathy is most needed; but the eyes of a good observer can penetrate the mask.

(2) The sympathizer must also have a good memory. He must recall occurrences which affected him more or

less profoundly, perhaps long ago. Most important of all, he must remember how he felt at the time.

(3) He must be a good thinker. He must be able to compare the causes which formerly acted on him with those which are now affecting others, and notice the points of likeness and difference. He must compare different temperaments and environment.

(4) He may have all these qualities in addition to a naturally emotional nature, and yet not be a good sympathizer. If he lacks imagination, he lacks the keystone to the arch. The causes of emotion, the environment, the tastes of others, are seldom literal copies of his own. He must by constructive imagination supply the elements which his own experience lacks. The more vivid and cultivated his imagination, the better can he put himself in another's place.

Hence it is seen that a stupid person cannot be sympathetic. This altruistic emotion is the result of long training. Sympathy cannot be put on and off like gloves. It is worth earnest striving for, since the sympathetic are alone fit to live with. Sympathy doubles pleasures and halves pains.

Necessity for Community of Experience and Taste. — For close sympathy between individuals, there must be harmony of tastes. If one is very fond of music, while the other is indifferent to it; if one desires much company, while the other prefers the solitude of the home; if one loves travel, while the other dislikes it; if one is intellectual and fond of reading, while the other is frivolous and rarely opens a book, — there can never be close sympathy.

Again, in order to give the powers of comparison and of imagination any materials to work with, there must

be considerable community of experience. Young people can rarely feel deep sympathy with the failing capacities and troubles of the aged. Many a mother has given her children as much sympathy as exists outside of Heaven, only to find them stupidly unsympathetic when the last bitter years come fraught with failing powers and helplessness for her. Where there is as much community of experience as there must necessarily have been between parent and child, there is, of course, slight excuse for this; but when one person has had little trouble or pleasure in common with another, it is useless to expect much interchange of sympathy.

The Increase of Altruistic Emotion. — As the race becomes more fully evolved, the altruistic emotions are increasing in scope and depth. Instead of, "It toucheth thee, and thou art troubled," the chronicler of the future will be able to write more and more often, "It troubled thee, although thou wast not touched." Some have denied the existence of altruistic emotions, but there are in evidence against this denial many orphan asylums, homes for the aged, societies to relieve distress and to protect children and animals. The number trying to improve the condition of the world is constantly increasing. Each year sees more efficiency in organizations for this purpose.

Intellectual Emotion.

Emotion is Developed by Intellectual Action. — All exercise of the mind is accompanied by feeling, and as this becomes pronounced and causes slight changes in the condition of the nerve matter and the physical expression, we have genuine emotion. There are complex pleasures

and pains, with their resulting emotions, entering into perception, memory, imagination, and thought. When we merely perceive the vast blue expanse of the quiet ocean, an emotion frequently rises from intellectual action. The gaze at the ocean is not passive. The mind is developing a train of associated ideas, which immediately form a part of the complex mental state, — ideas of blue eyes, and the blue depths of the limitless heavens; ideas of an Infinite Power, of an analogy between this restless ocean and life. From such perceptions, pronounced emotional states speedily develop, although they may begin in simple pleasurable nervous response to the stimulus of a pleasing color.

Let any one recall memories of the past, of times when he achieved success or appeared so foolish that he was disgusted with himself, of unkind words hastily spoken, of good deeds, — and he will find this representative intellectual action accompanied by deep emotion. When Macbeth's memory thrust before him the circumstances of the murder, emotion followed as the night the day. Shakespeare's plays and Milton's *Paradise Lost* gratify us because they set our imaginations to work, and emotional action follows. The reason why the vicious practice of building aircastles is indulged in, is because pleasure is a prominent element of the imaginative activity.

The emotions accompanying the exercise of the thinking power lack deep bodily resonance, but they are important and often extremely pleasurable notwithstanding. There was, probably, not a happier moment in Newton's life than when he had succeeded in demonstrating, that the same power which caused the apple to fall, held the moon and the planets in their orbits. When Watts discovered that steam might be harnessed like a horse;

when an inventor succeeds in perfecting a labor-lightening device; whenever an obscurity is cleared away, the reason for a thing understood, and a baffling instance brought under a general law, — intellectual emotion results. The principal intellectual emotions are wonder, surprise, belief, and perplexity.

The intellectual emotions in an eminent degree accompany the study of the best poetry. An example from Wordsworth will suffice to illustrate this: —

> "I have seen
> A curious child, who dwelt upon a tract
> Of inland ground, applying to his ear
> The convolutions of a smooth-lipped shell:
> To which, in silence hushed, his very soul
> Listened intensely — and his countenance soon
> Brightened with joy; for murmurings from within
> Were heard, sonorous cadences! whereby,
> To his belief, the monitor expressed
> Mysterious union with its native sea.
> Even such a shell the universe itself
> Is to the ear of Faith."

As the intellect traces out the analogy between the cadence in the shell and the sound of the parent sea, and finds the wonderful mechanism of the universe suggestive of a matchless Evolver, an emotion arises strong in proportion to the mental culture and capacity of the individual.

The Ludicrous. — The puzzling emotion of the ludicrous should be classed under the intellectual emotions, for it depends largely on contrast, and hence requires the exercise of the comparative powers to detect the contrast. As has often been said, a stupid person cannot see the point of a joke. Psychologists have pointed out two

elements in the ludicrous: (1) the feeling of *superiority* or glory, which appears so often in wit, and (2) *incongruity*, a characteristic of humor.

The feeling of superiority, or mirth over the discomfiture of another, is illustrated by the laughter when a pompous, aristocratic person slips and falls in the mud. It is still very human to chuckle when a rival receives a setback. A newspaper relates the following anecdote, — "What would you do in case you voted war on the country?" the reporter asked of a woman's rights woman. "I should be perfectly willing to send my husband to the war," she replied. This depends for its wit on the humiliation of the husband. The laugh is at his expense.

The element of incongruity generally raises an emotion of the ludicrous in any whose comparative powers are sufficiently cultivated to detect the incongruity. Mark Twain tells us of a city with very narrow streets, and adds that it is well that they are no wider. They now hold all the stench that can be endured. If they were wider, they would hold more, and the people would die. If a clergyman wearing a cook's cap and apron were to ascend the pulpit, the congregation would laugh. There might be nothing funny about the cap and apron by themselves, but their unwonted relations to the clergyman would raise an emotion of the ludicrous.

Æsthetic Emotion.

Origin and Scope of Æsthetic Emotion. — Æsthetic emotion has its origin in the perception of the beautiful. It has the least reference to self of any of the emotions. A pure æsthetic emotion must not contain a single element of desire for possession of the beautiful object. There

need be no relations between the person and the object, save the opportunity to perceive it. Any number of persons may be delighted without destroying the source of the pleasure. The blue sky, the starry heavens, the rainbow, the blossoms, the music from an orchestra, are not impaired by the gazers or the hearers. Eating is not æsthetic, because the viands must be destroyed in the process, so far as others are concerned, and the pleasure must be selfish.

Æsthetic pleasures were unknown in the barbarous age of man, when all the energy of the individual was necessary to protect himself and his family and to get a living. They arose when civilization allowed him to accumulate a surplus of energy, which could be worked off in a playful, disinterested way. Health, leisure, education, and money represent this surplus. The lower classes to-day, who constantly work for the necessaries of life, accumulate little superfluous energy to take the direction of æsthetic activity.

There may be three elements in æsthetic enjoyment: (1) the *sensuous*, (2) the *intellectual*, (3) the *associative*. Each of these will now be taken up in order.

I. The Sensuous Element. — When a person looks at a rose or a rainbow, the nerves of sight may be so acted upon that æsthetic pleasure is the immediate result of the sensation. The object is at once felt to be beautiful without any intervention of the intellect. Persons have almost danced with æsthetic delight the moment their eyes fell upon the exquisite tints of a hillside of maples in the autumn. It has been said that one part of the æsthetic delight from music is due to the fact that the harmony gratifies certain simple sensibilities of the nerves of the

ear. Perhaps their vibration in a certain way gives rise to this pleasure.

The sensuous element does not contribute the highest order of pleasure, but the possession of healthy nerves containing stored-up energy, capable of responding under the proper stimulus, is certainly an addition to those æsthetic pleasures where the associative and thinking elements figure largely. Even nerves differ in their power of æsthetic sensibility. Grant Allen says: "The vulgar are pleased by great masses of color, especially red, orange, and purple, which give their coarse nervous organization the requisite stimulus. The refined, with nerves of less caliber, but greater discriminativeness, require delicate combinations of complementaries and prefer neutral tints to the glare of the primary hues. Children and savages love to dress in all the colors of the rainbow."

II. The Intellectual Element.—The fact that one person can see beauty where another cannot, shows that it is, to a certain extent, intellectual. A Fiji would probably see little beauty in the finest art gallery in the world. We are rightly told that, "in ordinary cases, the æsthetic quality of objects is so slightly marked that only an exercise of attention can bring it definitely into consciousness." The power of close attention belongs to a cultured intellect.

Every time the mind discerns unity amid variety, order, rhythm, proportion or symmetry, an æsthetic emotion arises. We pick up the seed cone of a pine tree, and notice that the cone has the general shape of the parent tree. Further observation discloses the fact that each branch has the conical shape of the tree. Each little branch growing on a larger one is also conical. We perceive additional beauty in the pine as soon as we have

traced out this unity amid variety. When the unity running through the varied phenomena of heat, light, and electricity was discovered, the demonstration was justly called a beautiful one. If it is ever proved that all substances are, at the last analysis, one and the same underlying substance, whose different molecular arrangements are accountable for all the variety, the demonstration will appeal to the æsthetic feelings. They are also aroused at the suggestion that all the sciences may be merely component parts of one foundation science, the science of Being, although we have not yet discovered the unity running through these varied sciences.

The traveler with a trained intellect will see far more beauty than an ignorant one. In looking at a cathedral, a large part of the æsthetic enjoyment comes from tracing out the symmetry, from comparing part with part. Not until this process is complete, will the full beauty of the structure as a whole be perceived. If the traveler knows something of mediæval architecture before starting on his European trip, he will see far more beauty.

The opposite of the æsthetic, which we call the ugly, is the unsymmetrical, the disorderly — that in which we can discover no rhythm, plan, or harmony.

III. The Associative Element. — This factor is so pronounced in many æsthetic emotions, that some have thought that it was the necessary element in all such emotion. In our study of the association of ideas, we saw that ugly garments may come to be regarded as pleasing from being associated with well-bred or handsome people. The traveler rightly wishes to take a trip on the Rhine because of its associations. There is nothing objectively beautiful in a pile of disorderly stones — the grass sprouting over some,

others about to fall. The ruined castles derive their beauty from the legend and song connected with them. A beautiful maiden was formerly imprisoned in this castle, and one of the most chivalrous knights of all time finally rescued her after many adventures. Such stories are associated with the ruined pile, and in imagination we repeople the castle with all the figures of chivalry. We hear the song of the daughters of the Rhine echoing over the battlements. After witnessing a performance of Wagner's *Rheingold* the river would appear still more beautiful. And yet foreigners say that the Hudson is far more picturesque. The parts of the Hudson also that excite most interest are associated with legend or history. Travelers eagerly scan the Catskills, where Rip Van Winkle slept his twenty years' sleep, and where the crew of Henry Hudson are still said to hold their revels on tempestuous nights.

America is far richer in varied natural scenery than Europe, but America is so young that she lacks the associations which for more than a thousand years have gathered around every square mile of Europe. Comparatively few would visit Stratford-on-Avon, were it not associated with Shakespeare. Sully says: "The cawing of rooks is not a pleasing sound in itself, but is commonly regarded as such through its suggestions, *e.g.* sunny park and country repose. The effect of sublimity is largely a matter of suggestion. We are thrilled at the sight of an Alpine crag because of the suggestions of power, danger, and isolation which attend it."

Æsthetic Enjoyment Often a Resultant of all Three Elements. — The æsthetic emotions are frequently due to all three factors — sensuous, intellectual, and associative

—acting at the same time. Music may afford æsthetic gratification from all three sources. The mere harmony may affect the nerves in an æsthetic way. When the intellect traces out the relation of part to part, detects the harmony running through the entire composition, there is further æsthetic pleasure. If the tune is a national one, it derives beauty from its associations. The sound of the bagpipe is beautiful to a Scotchman because it is associated with Scotland.

Variations in Æsthetic Taste.—It has been said that æsthetics cannot be treated in a scientific way because there is no standard of taste. "*De gustibus non disputandum*" is an old proverb. Of two equally intelligent persons, the one may like a certain book, the other dislike it. Authors and many other persons know that there is nothing more variable than criticism. *Hamlet* is a much more popular play with the Germans than with the French. The same style of opera does not suit both the Italians and the Germans. The great French critic, Taine, did not like *Paradise Lost*. Taste not only varies among individuals now, but it has changed from age to age. In the early part of the Elizabethan Age, a stilted, antithetical, euphuistic style was popular. In Pope's age more attention was paid to form and elegance of expression than to the worth of the thought. The Dutch landscape gardeners formerly clipped evergreen trees into all sorts of fantastic shapes to imitate all kinds of animals.

While it is true that the standard of taste is a varying one within certain limits, it is no more so than that of morals. As men's nervous systems, education, and associations differ, we may scientifically conclude that their

tastes must differ. The greater the uniformity in the factors, the less does the product vary. On the other hand, within certain limits, the standard of æsthetics is relatively uniform. It is fixed by the majority of intelligent people of any age and country. To estimate the standard by which to judge of the correctness of language or of the literary taste of any era, we examine the conversations of the best speakers, the works of the standard writers. There is sufficient uniformity of taste for manufacturers to be willing to risk millions in making æsthetic articles. Authors and publishers risk time and money in bringing out books, because experience has shown that the public will like certain productions. Both German and Italian composers have certain principles, though different ones, to guide them in producing operas to suit the taste of their respective nations.

There are some things that can be pronounced in bad taste in any age or nation. All things which are in conflict with the laws of life — the laws of health or of morals — may be pronounced not æsthetic at any time. As Sully says, "We could condemn the Chinese taste for pinched feet or the English taste for pinched waists as bad."

Moral Emotion.

Characteristics of Moral Feeling. — (1) A moral emotion appears only on the perception of the rightness or the wrongness of human action. The relations of man to man, not of matter to matter, furnish grounds for this emotion. In this it differs from æsthetic feeling, which may be started by the perception of a rose. The moment we see a child neglecting a parent, or a man stealing from another or murdering some one, a moral emotion

arises. Some human actions, *e.g.* eating and walking, are neither moral nor immoral; only those actions which affect the welfare of others, which are intentionally benevolent or harmful, have relations with morality. The perception of a rainbow, a ruined castle, or autumnal scenery may raise an æsthetic emotion but never a moral one. Lear could blame the winds for buffeting his old and helpless head only after he had personified them.

(2) Moral emotion carries with it a feeling of oughtness, possessed by no other emotion. It says, "Thou shalt," or "Thou shalt not;" and, accompanying obedience or disobedience of its commands, there also comes a peculiar feeling of approval or disapproval. There is no such feeling of authority in an æsthetic emotion. We may admire a painting or a cathedral or not, just as we choose; if we fail to admire, remorse does not follow. But Macbeth felt that he ought to bar the door against Duncan's murderer, not bear the knife himself.

(3) The feeling depends for its validity on the fact that an action is freely willed. If a somnambulist killed another, or a man accidentally slew his neighbor, a moral emotion would not arise in connection with the deed, because it was not freely willed. Whether natural scenery or a human face wills to look beautiful or not makes no difference with the raising of an æsthetic emotion. Remorse can be satisfactorily explained only on the supposition that the person could have acted differently.

(4) The other emotions, as a rule, as they are now developed, impel us toward what we enjoy, toward pleasure and away from pain. This is especially the case with the æsthetic emotions. Even sympathy has its pleasant side, but the moral feelings frequently goad us toward dis-

agreeable duty. After men have stolen money from the government, by falsely swearing to the value of imports or in other ways, the moral emotion not infrequently prompts the return of the money. The government has regular entries of conscience money on the ledgers.

Different Theories of Moral Emotion. — Some have held that there is a special faculty called *conscience*, which decides unerringly between right and wrong. This opinion is well-nigh abandoned by scientific psychologists. A complex moral feeling deserves to be classed as an emotion as much as an æsthetic one. It is true that the emotion raised by the contemplation of moral attributes is a peculiar one; so is the feeling raised by the beautiful; so is every power of the mind, each one as divinely given as any other, and each as far beyond man's capacity to implant in matter as any other. What is called *conscience* is a compound of intellectual action and of feeling.

The development, or evolutional, theory holds that the complex moral emotion is a product of education, that this emotion was at first in the man very much as the oak is in the acorn — in an extremely undeveloped state. This moral feeling slowly developed along the line of utility, — not to the self alone, but also to the tribe or the nation. Hence the morally right is that which makes for the welfare of the greatest number.

The standard of the morally right has changed from age to age, like the æsthetic standard. The Romans thought it wrong to enslave a fellow Roman, not so an alien. The Spartan thought it perfectly right to put weak children to death, for they were a clog to the tribe. The evolutionist says that the standard has changed as the conception of utility to the greatest number has

changed; for instance, when times of constant war passed, weakly children no longer harmed the tribe so much as before, and it then came to be thought wrong to kill them.

The true theory seems to be, that the mind has original potential capacity for feeling in many ways, for instance in a moral or in an æsthetic way; that this capacity has been developed by experience and education, and that the development is still going on. Moral feeling has so broadened that the nineteenth century has seen the idea of the wrong of slavery extended from the whites to the blacks. When all things are finally averaged, the moral will be found to coincide with the useful.

True Meaning of Moral Utility.—The fact that the moral will be found to coincide with the useful in the broadest sense is liable to be misunderstood. Moral feeling to-day frequently rises when no consciousness of utility is present. If a boy saw a bully beating a smaller boy, the first boy would have a feeling of moral indignation, and he might also interfere without a thought of utility to himself. Few human beings would pass by a wounded man lying unconscious in the middle of a lonely road, although the traveler might be sorely inconvenienced in giving the aid. If he did pass by, the "serpent of remorse" might always hiss in memory's ear.

The feeling prompting helpfulness in such circumstances may have originally been due to a desire to preserve the family or the tribe, since the self was thereby benefited. But because a feeling has its roots in utility, it does not follow that this element is present in the fruit. A rose is not the mold out of which the plant grew; but it is just as fragrant as if it had not sprung from the earth.

How Altruistic Moral Emotion May Have Developed. — The following story illustrates how selfish emotion may have broadened into altruistic moral emotion: Two hunters, in primitive days, go hunting together, agreeing to share the game. They separate for a short time, when one kills a fawn. Almost at once he hears a cry for help from his companion, who is attacked by a wild beast. The first, thinking that he can retain the whole fawn if the other is killed, does not stir to help him, but throws it across his shoulders and starts homeward. Soon a wild beast, attracted by the scent of the fawn, gives chase, and the hunter barely escapes by throwing the fawn to the beast. As he goes home, hungry and empty-handed, he has abundant leisure to consider how both, acting together, might have defended themselves, and saved the game, and how half a fawn is better than none. He thus discovers, through experience, that narrow selfishness does not pay, and impresses this truth upon his children.

In some such way as this, the moral altruistic feelings arose. Now we often run to the assistance of another without a thought of utility to self. Every age sees these feelings broaden. From nothing, nothing is evolved; but a giant oak has sprung from a tiny acorn.

General Truths Pertaining to Feeling and Emotion.

Instinctive and Unconscious Tendencies. — At the basis of emotion is an instinctive tendency to react in a certain way, when the proper stimulus is felt. When the stimulus of increasing cold acts upon the wild goose in a northern latitude, the fowl manifests restlessness which passes into flight toward a warmer climate. When sense or ideational

stimuli act upon the human being, they tend to develop feeling which often passes over into more complex emotion.

A sense stimulus flows into the brain and develops feeling there by instinctive reactions in the nerve cells. This nervous affection is, in turn, reflected outward toward the muscles and vital organs and back from them, by laws determined for the individual by his nervous system. When the feeling begins with an idea, the excitement also tends to spread in the brain and to overflow into the rest of the nervous system; just as the waves, by mechanical law, spread in every direction when a stone is thrown into a small lake; and when they strike the shore, they are reflected back toward the center.

An emotion is instinctive in proportion as the stimulus tends at once to pass into conscious reflex action, which is necessarily accompanied by elements of feeling. Children will manifest fear of dogs and other animals before experience has developed ideas of danger from them. When a man runs his head into a beam, the emotion of anger often instinctively develops, before reflection can show that the beam was not to blame. Here the emotion of anger was the instinctive reaction to the stimulus. Infants frequently become instinctively angry when a toy slips from their hands, and men sometimes kick across the floor things which get under their feet. The mother does not have to be taught to love her child, for the instinctive tendency is already present.

Many of our emotions rise from a plurality of causes, some of which may have been operative in our ancestry ages ago. There is no doubt that a tendency to think, feel, and act in a certain way is transmitted by heredity. Darwin noticed that kingfishers on catching a fish beat

it until it was killed, and this fact explained to him why a captive kingfisher beat a piece of meat before eating it. Some persons have a natural love for machinery or art; others have a strong aversion to them.

Every one must have experienced feelings, — joy, sorrow, admiration, hope, fear, — arising from no adequate known cause; and has perhaps sought in vain for their source. Höffding thus states an important truth: "Unconscious impressions play an especially large part in the development of the feelings. Feeling is determined not only by clear and distinct sensations and ideas, but also by imperceptible influences, the sum of which only takes effect in consciousness. Hence the mystical and inexplicable character of so many feelings; especially when first excited are they incomprehensible even to the individual himself, since he does not know their definite causes. . . . We are never fully conscious of the influence of our experiences and the condition of life on our state of feeling, until the feeling acquires a distinctly marked character or even perhaps breaks forth in actions. Such influences are like the air we breathe without thinking of it. They occasion within us a quiet growth which is often the most important and decisive factor in the mental life."

From this it follows that the influences one grows up under, the very atmosphere of the home, school, or work, will all have their resultant lifelong effect upon the feelings. So will the books one reads, the company one keeps, the throng of images one allows to pass through his mind. If a person wishes to be happy in later life, he must look well to the earlier foundations of happiness.

Factors Determining the Rise and the Decline of Emotion. — On the day of the death of a relative, the emotion

of grief is frequently so strong as to render impossible any work on the part of the bereaved person. A year later he is attending to his work very much as usual. The emotion reached its height and then declined. The following are the principal determining factors:—

(1) The relation of the stimulus to the instinctive tendencies to emotion is an important factor. Many of the stimuli of life are not accompanied with profound emotion, because they are not fitted to rouse the deeper instinctive tendencies. Such stimuli are the air we breathe, the water we drink, and many of the most ordinary stimuli that daily affect our bodies. On the other hand, the cry of a child is directly adapted to call forth the deepest emotion from a mother's heart. When an ill-bred person gives us a hard slap on the back, the majority feel angry instinctively, because the blow by peculiarly jarring the spinal column sends a wave of bodily resonance to the brain.

(2) The limitation of nervous energy is the second factor affecting the height and continuation of emotion. Strong emotions involve tremendous nervous wear. As the nervous energy is lessened, the response is less and less powerful. Hence the emotion tends to decline, both because the body reflects to the brain less strong waves, and also because the brain cells themselves become exhausted and respond with less vigor. Less nervous fuel is added to the fire.

(3) The nature of the idea is an important factor in determining the rapidity of the rise of an emotion. The idea of a glass of water when one is not thirsty will have little effect. The mental image of a glass of strong drink may raise intense desire in the case of a drunkard. The prospect of the loss of a limb or of one's eyesight will raise strong emotions in any instance. Stating the case generally, the rapidity of the rise of an internally initiated

emotion will be due to the amount of pleasure or pain, immediate or remote, which the idea suggests.

The decline will be due to two reasons: (1) The attention cannot be intensely centered on one idea indefinitely. Attention implies expenditure of brain energy, which is not inexhaustible. As attention declines, the idea grows weaker, and the emotion begins to subside. When the attention is drawn away from mere bodily pain, it does not seem so intense. (2) Ideas of other things force themselves into the mind, claiming the attention and developing counter emotions, which tend to divert the mental energy from the old. This is the reason why physicians so often prescribe travel for both bodily and mental ills. In this way new things occupy the attention, and varying emotions develop in connection with them.

Changeableness of Emotion. — We shall never be fitted to deal with our fellows unless we recognize the fact that the emotional world must be one of change. The elements of feeling entering into emotion differ with every change in our nervous systems. A man sick, angry, or hungry, does not look at life in the same way as when he is healthy, cheerful, and well fed. Any one may notice how hopeful his thoughts often are in the morning, and how blue and uncertain they become in the dead of night. A contemplative German said that he had noticed that he often had a different opinion when lying down from what he had when standing. Ideas are also constantly changing, furnishing another reason for changing emotional states.

Strike when the emotional iron is hot, ought to become a maxim, for emotion does not generally remain long at its height. An agent for Grant's *Memoirs* said, that

the week following the general's death, there was harder work every day to make a sale, so quickly did popular grief decline. A certain city, at the time of Lincoln's death, talked of raising funds for a monument. Had the paper been circulated at once, a million would have been subscribed within a week. But time passed, and much difficulty was experienced in getting subscriptions.

Conspiring and Conflicting Emotions. — If we knew all the emotions that swayed a man, we could mark out with approximate correctness his orbit in life. The trouble arises from the complexity of the problem, from the fact that different emotions act counter to each other and may be struggling at the same time. It is seldom that desires all pull in one direction. An ease-loving person may wish to understand a certain subject involving much study. The love of ease and of knowledge pull in different directions; and by a rough application of the principle of the parallelogram of forces, we can compute the person's course. In this case it will lie between the path of hard, unremitting study and the road of complete indolence. A person both vain and selfish may be asked for a contribution to a charity. Vanity would prompt giving ten dollars, merely for the speech of people; selfishness would refuse to contribute. These forces pulling in different directions would cause a compromise, and five dollars might be given. A person may have a desire for strong drink and questionable amusements, and an equally strong desire to be thought well of by people. We could predict that his indulgences would be on the sly.

Life is largely a battlefield of conflicting emotions; and we are often at a loss to know which course is the more desirable. The greatest classical example of this is given

in Hamlet's soliloquy. Strong emotions urged him to lay down life, equally strong ones forbade the step, and inaction was the result. Perhaps the next greatest example occurs in *Macbeth.* In this case, the conspiring emotions were love of fame, power, and wealth, and a desire to gratify his wife's ambition; those conflicting were the feelings of relationship and hospitality for the aged king, and the fear of having to be tried for the deed in the courts of a future life.

Effect of Emotion upon Intellectual Action. — Here there is again a conflict. On the one hand, the emotions are favorable to intellectual action, since they supply the interest one feels in study. One may feel intensely concerning a certain subject and be all the better student. Hence the emotions are not, as was formerly thought, entirely hostile to intellectual action. Emotion often quickens the perception, burns things indelibly into the memory, and doubles the rapidity of thought.

On the other hand, strong feelings often vitiate every operation of the intellect. They cause us to see only what we wish to, to remember only what interests our narrow feelings at the time, and to reason from selfish data only. A lawyer said: "If it were not for the deflecting power of emotion upon reason, a part of our business would be gone. I now have a client suing for damages. His feelings magnify his own two and two, and their sum appears to him to be five. The defendant adds up that same two and two in the light of his own feelings and makes their sum three. My client wants a damage of five, so to speak; his opponent is willing to give but three. Schoolmasters may talk about the universal applicability of mathematical truths — how they never vary; but such talk only amuses

us in practical life. Men go to law every day because two and two are five, or only three, to them."

Emotion puts the magnifying end of the telescope to our intellectual eye where our own interests are concerned, the minimizing end when we are looking at the interests of others. It is very common for two persons to endeavor to tell their ailments at the same time, and for each to pay little attention to the other's complaints. Thought is deflected when it passes through an emotional medium, just as a sunbeam is when it strikes water.

Ideas Best Fitted to Raise Emotion. — Feeling cannot be compelled. Even if a person wishes to feel sorry, he cannot merely because some one tells him he should. There must be an adequate cause, just as so much fuel must be consumed to raise the temperature of water a given number of degrees. Many would-be orators rave and gesticulate wildly, but excite no emotion save disgust in their hearers. The English pulpit of the eighteenth century shows very well how emotions are not to be raised. The clergy preached on abstract charity, faith, temperance, and holiness. Gin mills multiplied under this kind of preaching, and signs like the following were displayed in their windows: "Drunk for a penny." "Dead drunk for twopence; clean straw for nothing." The nation grew more and more corrupt, until a genius arose who changed the style of preaching.

A large part of the business of life consists in moving the emotions of men so as to get them to act. Those ideas which give vivid pictures of a concrete act of injustice, of the doer of a noble deed, of an actual sufferer, seldom fail to raise emotion. If a man intends to get a contribution for the sick poor, let him not speak in general

terms of the inconvenience of sickness, the pains of poverty. One vivid picture of a forlorn room where a feeble mother is watching her sick child, for whom she is unable to procure proper food, will be infinitely more effective.

Any idea which suggests gratification of desire, any idea which vividly pictures something affecting the welfare of the self or of others, is apt to be followed by emotion. Probably no one can even imagine a person in a burning car, or lying helpless with broken limbs on a lonely road, without feeling the emotion of pity arise.

Contrast Necessary for the Full Development of Emotional States. — The principle of contrast holds good with stimuli of all classes, and especially with those which produce feeling that passes into emotion. If a pickle is eaten immediately after candy, the stimulus is more pronounced. A dead level of either pleasurable or painful emotion cannot maintain its intensity for a great length of time. If a child is scolded once in a while, the admonition may do some good; but ceaseless fault-finding will end by producing little emotional response. In fact, chronic fault-finders take the most effective means of rendering others callous to their complaints.

Failure to understand this principle of contrast is the cause of much disappointment in actual life. The student argues from the pleasures of one holiday to three months' or a whole year's vacation; but he soon finds that having nothing definite to do grows very tiresome. He frequently wishes school to begin that the monotony may be relieved. Children often take intense pleasure in a single piece of pie, and they fancy that if they could have four pieces at one time their pleasure would be four times as great; whereas the first piece seemed so good because it came

in the nature of a change. Young people often think, from the enjoyment received in spending a five dollar bill just as they please, that, if they had a million dollars to spend, the pleasure would be two hundred thousand times as great. A large part of the delight from spending a small sum is due to the contrast between having nothing to spend and being able to buy a few luxuries. The fallacy that unlimited wealth brings unlimited pleasure is a very common one. It ought to be remembered as an axiom, that the emotional world is one of change.

For explanation of this principle of contrast, we are, at the last analysis, forced to look to the nervous system. We find two reasons: (1) The nerve cells lose their energy for continuous keen response to the same stimuli. (2) Long-continued stimuli tend to make new reflex paths in the nervous matter. A reflex response is never accompanied with intense consciousness of the cause.

The Emotions and Health. — The best general tonics in the world are hope, joy, and its "various synonyms, contentment, cheerfulness, mirthfulness." The reverse is true of grief, fear, and anger. There is an old saying that grief will kill a cat. The first emotional hygienic law is: Be cheerful. Through the hole made by a gunshot wound in the abdomen of a certain man, the process of digestion was visible. The doctors noticed that whenever he experienced any of the depressing emotions, such as grief, fear, or anger, the digestive process stopped at once.

Dr. Benjamin Ward Richardson well says: "The passions which act most severely on the physical life are anger, fear, hatred, and grief. The other passions are comparatively innocuous. . . . Of all the passions I have enumerated as most detrimental to life, anger

stands first. He is a man very rich indeed in physical power who can afford to be angry. The richest cannot afford it many times without insuring the penalty, a penalty that is always severe. . . . We say a man was 'red' with rage, or we say he was 'white' with rage, by which terms, as by degrees of comparison, we express the extent of his fury. Physiologically, we are then speaking of the nervous condition of the minute circulation of his blood: that 'red' rage means partial paralysis of minute blood-vessels; that 'white' rage means temporary suspension of the action of the prime mover of the circulation itself. But such disturbances cannot often be produced without the occurrence of permanent organic evils of the vital organs, especially of the heart and of the brain."

The feeling of hope that accompanies faith has remarkable curative effects upon the body. Sir Humphry Davy was sent for to treat a man with a paralyzed limb. Sir Humphry intended to administer some nitrous oxide gas as a specific; but, before doing this, he wished to take the patient's temperature, and so inserted a small clinical thermometer under the man's tongue. The paralytic evidently thought this little thermometer possessed some wonderful magnetic or electrical power, for he declared that he felt its helpful influence all over his body. His confidence in Sir Humphry was so great that the latter concluded not to give any medicine. Every day for a fortnight he inserted the thermometer under the tongue of the patient, who was discharged cured at the end of that time.

Some of the wonderful cures stated to have taken place at the shrines of saints are undoubtedly true. The strong hopeful emotions which patients would feel under such circumstances could not help acting as a powerful restorative. The English monarchs used to have regular days for

curing certain diseases by touch. The hopeful emotions of patients thus touched sometimes performed astonishing cures. On the other hand, the story of Goody Blake and Harry Gill is said to have had an actual source. When listening to her imprecations beneath the cold moon, he may have been impressed with the fear that she had the superhuman powers of a witch. We thus are better enabled to understand what reasons there may have been for the belief in witchcraft.

A young Englishwoman was passing by Deptford Cemetery at dusk when some one with a white muffler over his face rushed out and chased her. The powerful emotion of fear thus raised paralyzed her heart, and she died. An autopsy revealed no trouble in any organ except the heart.

Dr. Tuke concludes his chapter on the influence of the emotions upon the bodily sensations by saying: "There is no sensation, whether general or special, excited by agents acting upon the body from without, which cannot be excited also from within by emotional states affecting the sensory centers, such sensations being referred by the mind to the point at which the nerve terminates in the body."

Contagion of Emotion by Sympathy. — It is remarkable how quickly an emotion will spread from one individual to others. The emotion of fear, which at first breaks out in a a small detachment of an army, may soon throw the entire host into a panic. It is much easier for a speaker to move a large audience than a small one. The more individuals present, the greater is the chance that some will be responsive to one kind of ideas; others, to another kind. The emotion raised by either will tend to spread to those who might not have been directly affected. In the history of the world, one man has repeatedly molded a mob to do his will.

Dr. Benjamin Ward Richardson instances the case of a girl who occasionally visited where there was a relative suffering with St. Vitus' dance. The girl soon sympathetically acquired the contortions of countenance peculiar to that disease, and she was never able to rid herself of them. He also tells how the child of an English scientist spontaneously commenced to imitate the contortions of her father's patient, not in mockery, but as if governed by uncontrollable impulse. From this child the disease spread to another, and so on to a third. They recovered only after being carefully separated from each other and from the original cause. The writer knows a person who is a confirmed stammerer, due to sympathetic imitation of a stutterer.

Our emotional state is, in part, determined by the prevailing emotional tone of those around us, and we at the same time help to color their lives. All people tend to reflect their surroundings. Even pictures of smiling faces often cause the observers themselves to smile. It is difficult to be sour in a merry company. Persons who grow up in a cheerful family or community generally catch the dominant emotion. Members of a family where the usual tone is pessimistic or fault-finding, seldom prove desirable to live with. The practical truth to be deduced from this is, not only to try to be cheerful one's self, but also to seek cheerful company.

CHAPTER XI.

THE CULTIVATION OF THE EMOTIONS.

Formation of Correct Emotional Habits. — All emotions deepen by repetition. If one allows an undesirable feeling to master him once, he should be on the watch to check that feeling at the start on the occasion of a second manifestation. The man who falls into a rage once, falls into the same emotion easier a second time; the man who keeps cool once under trying circumstances, will be more easily able to control himself the next time. If a person forms the habit of being pleased with small things as well as great, joy may become his dominant emotion. After a while he will find it hard work to become displeased with many occurrences at which another is constantly grumbling. Looking on the bright side of life soon grows to be as much of a habit as the reverse.

Some persons start a train of worrying emotions the moment a move is made. If a member of the family goes driving, a runaway is the only possible end; if walking, something ill must result; if sailing or rowing, drowning must be the outcome. On the other hand, a person accustomed to look on the bright side of life feels a pleasurable glow of emotion in thinking how much enjoyment the absent one is probably experiencing from the drive, the walk, the sail, or the row. Any person can, to a certain extent, bring about a desired emotional

change by summoning only those ideas which tend to raise the desired emotions. If a relative crosses the Atlantic, and if those at home desire to have a joyful feeling in the ascendency, let them think of the strength, comfort, and careful management of the steamships, of the far less proportional loss of life from water than from land travel. If the emotion of grief is desired, let ideas be summoned of icebergs, fogs, collisions, people starving in open boats, and drowned persons tossed upon the beach by the waves.

The truth cannot be too strongly emphasized, that a habit of emotional feeling is, at the outset, often the result of an intellectual habit. Summon different ideas to the mind, and notice how the emotion changes with the idea. Let a messenger implant in a mother's mind the idea that her son has just been killed in an accident. Every one knows what kind of an emotion will follow. Let a second messenger come, saying that the boy is not dead but only injured, probably not fatally. Another emotion follows the lead of that idea. Let a third messenger come with the news that a mistake has been made in the identification, that her son is uninjured. A different emotion follows this idea. To repress certain trains of feeling, repress the ideas that give them birth. This will have restraining power, even where the emotional state tends to bring up a consonant idea, just as a fire may suggest the idea of putting fuel on it.

Culture by the Repression of Emotional Expression. — The nervous concomitants of emotion demand attention as well as the intellectual elements. As we have seen, nervous action is a strong element in emotion. Has a person any control over his nerves? One would think that only very young children would ask such a question, but such

is not the case. We innervate our motor nerves and start to pick up a pear. We notice a hornet on the pear, and we inhibit the movement. By restraining the expression of an emotion, we can frequently throttle it; by inducing an expression, we can often cause its allied emotion.

Professor James says: "Refuse to express a passion and it dies. Count ten before venting your anger, and its occasion seems ridiculous. Whistling to keep up courage is no mere figure of speech. On the other hand, sit all day in a moping posture, sigh, and reply to everything with a dismal voice, and your melancholy lingers. There is no more valuable precept in moral education than this, as all who have experience know: If we wish to conquer undesirable emotional tendencies in ourselves, we must assiduously, and in the first instance cold-bloodedly, go through the *outward movements* of those contrary dispositions which we prefer to cultivate. . . . Smooth the brow, brighten the eye, contract the dorsal rather than the ventral aspect of the frame, and speak in a major key, pass the genial compliment, and your heart must be frigid indeed if it does not gradually thaw" (1). Thus we see that if we put on a cheerful air, the expression will react upon our feelings and make us actually happier. Some persons have become habitually morose from allowing *expression* to their incipient disagreeable feelings.

Novices frequently make the mistake of thinking that intense expression of emotion indicates not only a character rich in feeling, but also one that will make great unselfish sacrifices for the welfare of others. The truth lies generally in the opposite direction. Many persons expend all their energies in the expression of emotion and have none left for action. Some demonstrative people find it difficult to understand that to feel intense sympathy

is not the same as to exert themselves in actually relieving distress. The world could very well spare a million of those who only *feel* for a dozen of those who *act*.

Culture of the Altruistic and Moral Emotions. — Enlightened sympathy is at the basis of all ethics. The steps leading to intelligent sympathetic emotion have already been pointed out. To give it practical material to work with, one must go out into the world, observe carefully instances of happiness and misery, sickness and poverty, disappointment and heartache from life's hundred-handed causes. Occasional visits to the sick and suffering poor frequently serve to stimulate altruistic emotion strongly. One cannot grow sympathetic if he shuts himself away from the world. For this reason an only child is generally selfish. If a kitten is to be kept as a pet, it should be brought up with other kittens. It will then learn in the school of experience the pains due to playful scratches, and scratch less often.

The experience of young persons is generally too limited for their moral emotions to be well developed. The young need to be brought face to face with that additional human action which is given in the pages of history and of fiction. Such characters as Nero, Luther, Alfred the Great, Cromwell, Napoleon, Wellington, Washington, Clarkson, and Wilberforce will leave their mark on the moral emotions. The religious persecutions, the Spanish conquest of Mexico and Peru, the treatment of the American Indian, the drama of human slavery, — all are historic actions which have a powerful moral bearing. The pages of the greatest novelists teem with actions which call forth our moral approval or disapproval. The tone of the family, the school, and the community, in which a person is brought

up, has a constant powerful effect in molding his moral emotions. No one will ever cultivate these to the best advantage unless he constantly watches his own actions and notes their effect upon others, unless he frequently puts himself in another's place. This necessitates culture of the reasoning powers and of the imagination.

Culture of the Æsthetic Emotions. — The three elements in æsthetic feeling — the sensuous, the intellectual, and the associative — indicate the line of cultivation. One's nerves as well as one's muscles improve with exercise. We have said before that no amount of exercise will enable a weak man's muscles to equal a Sullivan's, but they will improve. This truth must be maintained in the face of the false assertion that a man's nerves, brain, and other parts of his body are given him once for all and are subject to no improvement. It is a matter of record that nerves have improved in discriminating power, whether in reference to sound, colors, taste, touch, or odors. With exercise on the proper objects, the nervous mechanism concerned in the feeling of sensuous beauty can be improved. Flowers, leaves, sunsets, paintings, varied scenery, — all will contribute to the cultivation of this factor of æsthetic feeling. Lack of this exercise early in life will permanently weaken the power.

The rules for the cultivation of thought apply equally well to the intellectual factor of æsthetics. The tracing out of unity amid variety, of symmetry, harmony, and rhythm in any branch of study, puts one on the right road to this culture. One feels a touch of æsthetic feeling in discovering the unity of relation between anything so varied as the leaves of a tree and the lungs of a man, or the analogy between the human soul and the butterfly.

The study of the best poetry is specially fitted to cultivate the æsthetic emotions on the intellectual side.

To get the fullest amount of beauty due to association requires universal cultivation. The great truths of nature, of history, of biography, and of literature must be known. The more a traveler knows of the associations clustering around the various places that he visits, the more æsthetic gratification will he receive. If he stands on the wind-swept promontory of Whitby without knowing that it is the birthplace of English song, or the story of the poet who there first struck the lyre which Milton afterwards took up; if the Trosachs are visited before Scott's *Lady of the Lake* has been read; if a trip is taken up the Hudson by one unfamiliar with Washington Irving's works, — much beauty will in every case be lost.

In general, we may say with Allen that "good taste is the progressive product of progressing fineness and discrimination in the nerves, educated attention, high and noble emotional constitution, and increasing intellectual faculties" (2). To cultivate the æsthetic emotions, it is absolutely necessary to remove the attention from the self and to make it objective. One selfish element shatters this feeling. It is hard for a conceited or a selfish person to find beauty in anything but himself. A person always desirous of self-aggrandizement, whether in the direction of money or influence, can rarely get much æsthetic comfort from the world, because his thoughts have become habituated to running selfward.

Enjoyment as a Fine Art.

The Object of Life. — With the passing of asceticism and its abuse of the body, the feeling that it is wicked

to be happy has slowly declined. The belief that it is one's duty to enjoy this life, is slowly prevailing. Logically, there are three, and only three, possible alternatives in life. We can plan (1) to be happy, (2) to be unhappy, (3) to be neither happy nor unhappy, but in a neutral state like sleep or unconsciousness. We are limited absolutely to these three courses. This logical division shows that the only point for dispute relates to the means to be employed for securing happiness, misery, or a neutral condition.

Any order of beings that prefers pain to pleasure is speedily eliminated by the conditions of existence. If one constantly picked up red-hot irons, drank strong acids or boiling water, or wounded his body, he would soon perish. Pain is an alarm bell rung to warn us that some part of the body is suffering disintegration. Pain is beautiful only as a series of well-directed signals to warn us that we are treading on dangerous places; it is the result of bodily impairment or moral sin. It must be emphasized at the outset, however, that ill adaptation to environment and the existence of sin render it absolutely impossible that we should escape all pain; only the amount ought not to be thoughtlessly or needlessly increased. But the pains due to selfishness and lack of sympathy will be found greater than those involved in the effort to be unselfish and sympathetic. This has been sufficiently emphasized in preceding sections.

There must also be a sharp distinction drawn between what is merely distasteful and what is painful. A pupil may have a distaste for study, but he will never amount to anything, nor lay the foundations of happiness, unless he conquers that distaste. Again, actions which are painful at the start may, through the adaptation of the organism

or the mental powers, come to be positively pleasurable. On the other hand, things which are accompanied with pleasure at the start often bring lasting pain. Hence, in seeking for enjoyment, the future must ever be borne in mind. Only those actions are to be recommended, which bring the greatest permanent elements of enjoyment to the greatest number. One individual may have to perish to save others. Such is the law of life.

Factors in Enjoyment. — The factors in enjoyment will repay careful study. In order to enjoy anything, there must, first, be something to enjoy. In order to enjoy a house in cold weather, one must first have the house. If the sitting-room is handsomely furnished; if there are entertaining pictures, ornaments, books, a handsome carpet and furniture, there is something more to enjoy. But this is not all; in fact, it is less than half. A person racked with pain could not enjoy the room; health also is necessary for enjoyment. An uncultivated person could not derive much pleasure from the pictures, the delicate ornaments, and the books; a cultivated mind must be had. If the inmates flew into fits of rage, or acted inconsiderately and selfishly, there would be heartaches and unhappiness; there must, therefore, be moral control, the control of the emotions.

It is well to notice that there are several factors in enjoyment, all as necessary as the heart, the lungs, the liver, and the stomach are to the body. A discussion between the heart and the lungs in regard to which is the more necessary, would be extremely unprofitable. Life could not be maintained in the absence of either organ. An ill-clad, homeless person out in the wintry night, with the sleet cutting him like a lash, lacks what may be called the *objective* elements of happiness, *e.g.* good clothes and

a warm home. All the preaching in the world will not make this man happy; he has nothing to enjoy.

The *subjective*, or rather the *personal*, elements of happiness are (1) *health*, (2) *intellectual education*, (3) *cultivated emotions*, and (4) *a trained will.* Diminish any one of these factors and the capacity for enjoyment is lessened.

In order to enjoy food, there must be something to eat as well as a good stomach, and a good stomach as well as something to eat. Asceticism failed of enjoyment and made its devotees wretched, because it neglected the objective side of pleasure. Materialism has not brought permanent happiness, because sufficient attention has not been paid to the subjective factors, especially morals.

Occasional change, or *contrast*, is a necessary factor for enjoyment. Leisure is much more enjoyed after a period of hard work. The buds and blossoms of the spring thrill us with pleasure after the barrenness of the winter, but the pleasure soon declines because of the well-known emotional law based on declining nervous response and intellectual attention. We enjoy travel because there is an element of constant change in it, but we should grow weary if we traveled all the time.

The man of one idea, who keeps himself in one routine of thought or business, may go through life with few pains; but he will not know what varied, keen enjoyment is. This is the strongest possible argument for a liberal education. A person so trained has many points of attachment to the pleasures of life. He drinks in fuller measure of the cup passed to him in the hands of variety and contrast. His tastes are not narrow. But we must caution those naturally fickle, that this principle of contrast will not work unless there are periods of unremitting labor on some one thing. The mind cannot appreciate contrast

until the mental powers have fathomed the subject in hand. Some persons insist on so much change, that the change is the rule; and there is no contrast in one line of action, even if that line is constant change.

It must not be supposed that only the wealthy can bring into their lives the element of change requisite for enjoyment. If one keeps himself on the alert for contrast and change, he will be astonished to find out how much may come even to the meanest life, if there is the intellect to observe and the imagination to gild. Scotland's greatest poet was a poor plowman, but he had an eye for contrast, and a power to make the most out of the paltry changes in his life. To all there comes the quiet of the winter, followed by one of the most pleasing imaginable changes, — the budding life of spring. Changeful Nature ushers in the summer with its varied fruits, and then the autumn with its harvest and wonderful coloring. Each period of twenty-four hours brings remarkable changes — the sunrise glinting on dew or frost or alchemizing the clouds, the full day with its inflowing tide of industry, the glowing sunset, and the starry night. This is a wonderful world of change, and the life of a person of varied culture can never be humdrum.

Another strong factor in enjoyment is *activity*. Inactive persons never attain high enjoyment. Pleasure is an invariable accompaniment of activity of the right kind. The power to enjoy one's self is augmented by every increase of bodily and mental vigor. One must have an aim in life and be active in accomplishing something. There is more pleasure in wearing, than in rusting, out.

Pretensions Fatal to Enjoyment. — The giving up of many pretensions is absolutely necessary to happiness.

Many of the pretensions with which an individual starts in life are not of the slightest use to him. He causes himself much trouble in maintaining them before the world, because it will judge him by his success in playing the character he assumes. There are innumerable persons miserable to-day because of their musical, athletic, and fashionable pretensions. People are constantly weighing themselves down by pretending to knowledge of which they have only a smattering, to the possession of a small foot made by wearing a torturing shoe, to a petite figure secured at the expense of deformity, to be wealthy when they are forced to run in debt. Laying aside the burden of these pretensions would give them a chance to enjoy themselves. If a person makes no pretensions to a knowledge of art, Italian, chemistry, architecture, music, or sailing a boat, people will think nothing of his ignorance in these matters. He will be judged by what he does pretend to know, and no sensible person will expect him to be a universal genius.

Enjoyment by Indirect Means. — It has been said that enjoyment never comes when searched for, that pleasure must be obtained by indirect means, that it comes as a gratuity only when something else, *e.g.* duty, is the paramount object. This statement is probably more than three quarters true, yet the fact that it is not entirely so has caused many to repudiate the theory completely. If a person went to Europe with the prime object of enjoying the trip; if two years before he started he began to read about the points of interest in the countries he intended to visit, with the sole object of receiving enjoyment therefrom, — his pleasure on the trip would not thereby be lessened. A theatrical performance will probably be en-

joyed just as much, if one attends it for the purpose of receiving direct pleasure.

Asceticism taught the opposite view. But in spite of these self-evident instances to the contrary, it is true that, if one makes selfish enjoyment his pursuit, he will ultimately fail in the attainment. A trip abroad would be vastly more enjoyed, if there were an agreeable companion to share the pleasure. It is a matter of record that enjoyment of the very highest type has come from making others happy. He that seeketh his own selfish life of pleasure shall lose it, is a statement, the truth of which is every year demonstrated by the selfish; for they shut themselves out of the world of keenest enjoyment.

Necessity of Early Learning How to Enjoy. — There is a time in the lives of almost all when the emotions are ripe for certain courses of action. The desire will cease if the means for gratification are neglected for a certain length of time. The boy who, from timidity or lack of leisure, neglects athletic sports will soon find that his love for them is gone. To take them up at a later time will seem strange and irksome to him.

There are persons who have been enthusiastic travelers until past seventy, because their youthful passion for seeing something of the world was gratified when the emotion was strong. It was repressed in others who had the desire equally strong. At the age of forty they found, when a chance for travel finally presented itself, that strange food, strange beds, strange people, strange climates, with the interruption of established habits, brought more discomfort than pleasure. These persons returned to their old haunts, wondering what enjoyment their former associates could find in being carried around from pillar to post,

chilled with Alpine cold and bitten by Italian fleas. And yet if these disgusted people had traveled while desire was strong and adaptability great, the fleas and frosts would have been only small clouds in the sky of pleasure.

A desire for reading about people in strange countries, an interesting historical epoch, or the deeds of some great man, is generally present in youth. If not, the desire may then be easily cultivated, whereas it cannot be in later life. Again and again have persons, whose early training was neglected, endeavored to acquire a liking for reading. Time hung heavy; they had no entertaining company; but they simply could not get interested in books. The twig could have been bent, but the tree cannot.

A study of animals has shown that, in many cases an instinct will die unless it is gratified at the proper time. Dogs have been kept on a hard floor while young until their instinct for burying food had passed away. A hen took her litter of chickens to a lake and endeavored to get them to swim. She had previously hatched only ducks and had thus formed a new habit of caring for her young. "Mr. Spalding tells me of a friend of his who reared a gosling in the kitchen, away from all water; when this bird was some months old and was taken to a pond, it not only refused to go into the water, but when thrown in, scrambled out again as a hen would have done. Here was an instinct entirely suppressed" (3).

The same analogy holds good in the vegetable world. Seeds will sprout only under the right conditions; and after they have sprouted, they will die unless they soon have the proper soil in which to grow.

All these arguments show that it is of prime importance to nourish, in the bud, all those inclinations, tending to develop in us powers which may be the basis of much

future enjoyment. On the other hand, if an early immoral tendency, whether toward strong drink, gambling, or other form of vice, is repressed, the desire in that direction will grow weaker and weaker, and finally die for lack of food. Nature emphasizes the fact that she has one time for a thing. The thoughtless person may delude himself with the idea that he can plant his Indian corn in the autumn. So he can, but Nature will not allow him to reap a harvest.

The duty of enjoyment should be taught as a question of morals. Deprivation of food and clothing weakens the body. Deprivation of pleasure tends to make the life hard, unimaginative, and hence unsympathetic. Pleasures are largely the result of the play of the imagination and the kinder graces in general. More than half our pleasure comes from anticipation, and that is a manifestation of the constructive imagination. Those who have paid but little attention to judicious enjoyment are generally not pleasant to live with. Their narrowness and want of sympathy chill all with whom they come in contact.

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1. James's *Principles of Psychology*, Vol. II., pp. 462–3.

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CHAPTER XII.

THE WILL.

Reflex, Impulsive, and Instinctive Action.

Will Differentiated from Other Mental Powers. — Will concerns itself with action. The student must keep that fact before him, no matter how complex the process seems. As we proceed, we shall see that the will is restricted to certain kinds of action. From the cradle to the grave, we are never passive recipients of anything; in other words, we are never without the activity of will in the broadest sense of the term.

How shall we distinguish between feeling and will? There is no more precise line of demarcation than exists between the Atlantic Ocean and Davis Strait. We saw, while studying sensation and perception, that the various mental powers worked in such unison that it was hard to separate them exactly from each other. The difficulty is especially great in separating feeling from will, because there so often seems to be no break between the two processes. We are aided in marking off these powers by two sets of experiences. (1) We sometimes experience feelings from which no marked action results. They evaporate, leaving no trace in the world of action. (2) We feel sorry for the poor or the sick, and leave our comfortable homes, perhaps on a stormy day, to go to help them. It is plain that there is an added element in the second

experience. That element is will, which was not obtrusively present in the first experience. The germ may have been there, but not the full flower.

Whenever there is in emotion a motor element which tends to go out in action, that element is will. When I feel angry and strike, or grateful and assist some one, the striking and assisting are the result of a peculiar, active power, which we call will. In some emotions, the voluntary element may be so small as to baffle detection, but the germ is there.

We can also roughly differentiate intellect from will by two sets of experiences: (1) When a loud clap of thunder assaults our ears, when unsought ideas drift into our minds, when crape on a door suggests death, when dream images follow each other unsought and undesired,—there is no marked element of will in these intellectual manifestations. (2) When we innervate our auditory nerves to catch some slight sound, when we detain an idea until its desired associate is recalled, when we hold two ideas before the mind to compare them,—we are using will power. Wherever consciousness displays active attention, there is will.

Foundations of Will.—Since the will has to do with action, we must first familiarize ourselves with the potential capabilities of will, for these are antecedent to the higher type of volition. The more developed capacities of will are furthered, or hampered, by causes operative below the stream of consciousness. Sometimes we do things which astonish ourselves as much as other people. Our actions are conditioned by our nervous systems, which have, in turn, been modified by all the past experiences of our ancestry. The peculiar structure and

adaptability of the nervous system, with the unconscious modification which experience constantly causes it to undergo, exert a force which makes itself felt in every voluntary decision. Each day's experience passes into an unconscious product, which will affect our decisions for all future time.

Different Types of Action. — Approaching the will first from the lower side, we may classify actions as follows, and then proceed to treat them in order: —

I. *Unconscious reflex action.* A typical example of this appears in the unconscious movement of a sleeper's hand, when touched.

II. *Conscious reflex action.* This is illustrated by a sensation which reaches the brain, and hurriedly passes out in motor action, so that consciousness is merely a passive spectator. The winking of the eye due to the sensation of light is an example.

III. *Impulsive action.* Here a hazy idea of a purpose toward which the action tends, makes its appearance. In the two preceding cases there was not the slightest idea of purpose in actions, for they had either begun, or were completed, before consciousness realized their aim or object. The word "impulse" is popularly used in several different ways. We here mean an incentive toward a dimly conscious end. In impulse there is no such consciousness of power to choose between different alternatives as exists in higher voluntary action.

IV. *Instinctive action.* This cannot always be separated from impulsive action, but there are generally some qualities which roughly mark off the two kinds of action. Instinct gives complex action toward a definite end which is not foreseen, as when the silkworm spins her shroud.

We may consider impulse as less complex in its workings, but marked by more consciousness of the purpose of the action.

V. *Deliberative action.* We have now come to the highest type of action, but a type which could never have existed except for the preceding types. Here, a deliberating will chooses between alternative courses of action. Shall I spend this money for books, or for several other things? Shall I go to the theater to-night, or remain at home? In deliberative will there is a definite idea of the object sought and of its worth. Thought is always present to weigh in the balance opposing objects and actions.

In the following sections, we shall look at action from these five different points of view.

Unconscious Reflex Action.

Complexity and Apparent Purposiveness. — All human action is conditioned by the nervous system. Nervous cells have the very important power of performing unconscious actions to effect a definite purpose. If the hand of a sleeper is gently pinched, he will withdraw it, although he knows nothing of the action. The sensory nerve will convey to the spinal cord the stimulus caused by the pinching. Nerve cells are there set in action, which flows out by a motor nerve, and the hand is moved.

Reflex action is, strictly, action reflected back. The simplest type of this may be shown in the case of a rope passing around a pulley and attached to a bucket. The pulley "reflects" the force in the contrary direction. When one side of the rope is pulled down, the bucket rises. The spinal nervous ganglion here corresponds to the pulley, and reflects the force which moves the muscle.

A reflex action is caused in two ways, (1) by an external stimulus to a sensory nerve, or (2) by the organic condition of the nerves and body. Actions of this second class are sometimes called spontaneous. Here we have a capacity for internally originated movement. This spontaneity shows a marked advance over ordinary matter, for a stone can be moved only from without. It cannot move itself as can the amœba.

It is sometimes hard to believe that reflex actions are not consciously willed. We have seen that a decapitated frog raises its hind foot to brush away a needle or a drop of acid on its side; if the leg on that side were amputated, the other leg would display purposive endeavor to remove the object. It is difficult to appreciate properly the complexity of reflex action. Many movements which seem to exhibit all the purposive guidance of the deliberative will are nothing but reflex actions. Acts which were at first consciously willed, often sink to the level of reflexes. Such are walking, writing, balancing, and many other muscular movements.

Law of Central Nervous Action. — Whenever a sensory stimulus is transmitted to central nerve cells, the force is never lost, but it tends to flow out again in motor action.

If water flows in by one of two equal-sized holes at the same height, on opposite sides of a vertical cylinder, the water must flow out as rapidly as it flows in, after it has reached a given height. The inflowing stream may here be likened to the stimulus transmitted by a sensory nerve; the cylinder corresponds to the central nerve cells, and the outlet to the motor nerves. The amount of water required to fill the cylinder up to the outlet corresponds

to the inertia of nerve matter, to overcome which inertia a certain amount of stimulus is expended before motor action results. By central nerve cells, we here mean ganglia in either the brain or the spinal cord. Whenever a sensory stimulus pours into nerve cells, there will be a tendency for it to pass out in motor action, which causes muscular movement. This law holds equally good for conscious or unconscious stimuli. If water flows into a lake, there must be an adequate outlet or the lake must rise. No force of any kind is ever swallowed up and lost without producing an effect. It is well to remember this as we proceed with the study of the will. We shall find that our higher voluntary actions get their character from this inflowing stream. They will vary as it has varied, and will be colored by it.

Conscious Reflex Action.

Difference between Conscious and Unconscious Reflexes. — Reflex action in its simplest form is unconscious. The next higher stage of action passes through the lower fringe of consciousness, so to speak, but is in no wise swayed or deflected by consciousness. The student will more easily understand the difference between conscious and unconscious reflexes, by the aid of an analogous illustration. Half a barrel hoop, or anything else which forms a semicircle, may be used to represent the course of nerve action. Holding the hoop vertically, immerse it completely in a cask of water, which may represent the brain or spinal ganglia. The air above the water represents consciousness. If pressure is exerted at one end of the hoop, the force will be transmitted through the arc to the other end. This illustrates unconscious reflex action. Now

raise the hoop so that the top of the arc is above the surface. Force applied at one end will be transmitted to the other. This may serve as a type of conscious reflex action. One half the arc to which pressure is applied corresponds to a sensory stimulus; the other half, to motor action. So long as the sensory stimulus passes into a motor current beneath the stream of consciousness, the resulting action is an unconscious reflex. If any part of the action passes through consciousness, without being affected by it, we have a conscious reflex.

The student will not have a clear idea of these different types of action, unless he follows Tyndall's advice and thinks them out by the aid of images. According to this view, conscious reflex action, if changed at all, is imperceptibly changed by passing through the lower stratum of consciousness. Suppose, however, that the cask is filled to the brim with water and that the air is in tense motion because of a strong wind. Let the semicircular arc be raised some distance above the surface of the water. If pressure is applied to the end of the arc, there will still be transmission to the other end. But here another deflecting force is felt, that of a strong wind blowing against the hoop. This typifies the force exerted by conscious attention, represented by the strong wind. The action can no longer be called reflex; another power has intervened to change the direction of the reflex force. This brings us to the highest type of action.

Unless we are prepared to adopt the unscientific hypothesis that consciousness exists for no purpose, we can see no difficulty in supposing that consciousness may thus modify action. If we admit that things exist without a purpose, we may as well stop study in any science.

We have here brought up higher voluntary action before

we are ready to proceed with its consideration, because it is wise for the student to grasp the relations between these three types of action.

Illustrations of Conscious Reflexes. — When we jump or scream because a loud sound is suddenly heard, the sensation consciously affects the brain, and passes into motor action, with consciousness as a passive spectator; or if not passive, the deflecting force of consciousness is too small to be measured. If, however, conscious attention was already on the alert, the scream might be restrained, and the force at the summit of the arc diffused in other directions.

A conscious reflex action is directed by no idea of purpose. We do not know why we scream or jump on hearing an unexpected sound. A flash of light registers a sensation in the brain, and we wink without knowing why. Conscious reflexes are generally unvarying, as we might expect, because their direction is determined by nerve mechanics alone.

Summary. — All kinds of reflex action may be likened to an arc, one half of which is sensory, the other half motor. The tendency of all action is to pass through the entire arc. At the summit of the arc, we may suppose nerve cells where the action is reflected. This summit lies sometimes above, sometimes below the level of consciousness, but the reflex action goes on its course undisturbed by it. Many actions once voluntary become habitual reflexes with advancing life. No reflex action shows the presence of will in its higher deliberative form, although purposive reflexes may indicate a time when they were the slowly formed products of all the individual's intelligence and will power.

Impulsive Action.

Meaning of the Term. — When the same word is used in several different senses, the discussion tends to become obscure, because of changing meaning. We must at the outset note the different meanings attached to the word "impulse." (1) It is used, in a physiological sense, to express an unstable equilibrium among nerve cells, or a tendency to pass into motor action. (2) Impulse, on the mental side, is a condition of striving toward something not clearly represented in consciousness. (3) Impulse is a tendency to act in one direction and in one only. The tendency is due to peculiarities of both nerve and mind. The object sought for in impulse is not clearly foreshadowed. One is impelled to escape a present state of tension, and for that reason he acts. We shall use "impulse" in this third sense.

When impulse grows into a longing for a definite object, we then call the mental state desire. When this state make its appearance, the will has passed to a higher stage of development. Impulse knows no conflict of motives, no deliberation. The tendency is all in one direction. The laws of some nations make a clear distinction between impulsive and deliberate homicide.

Varieties of Impulse. — While human impulses are as numerous as the objects which bring pleasure or cause pain, a very rough attempt may be made to classify them. The most primary form of impulse is toward pleasure and away from pain. As experience widens, impulses are felt in the form of tendencies to go out toward relatives, companions, money; in short, impulses incite toward any action tending to gratify the man physically, intellectu-

ally, æsthetically, or morally, and away from actions which tend in the reverse direction. This statement has approximate truth, or the race would perish.

Some psychologists classify impulses according to whether they are due (1) to *sensation*, (2) to *perception*, or (3) to *reproduced ideas* or *images*. The impulse to shrug the shoulders and draw the arms close to the body results from the sensation of cold. Turning the head to watch the flight of a bird across the field of vision is an example of a perception impulse. To look for shelter when clouds threaten rain, and before rain has actually fallen, is an imagination impulse. Here, the imagination must first represent the rain as actually falling, as a pictured sensation impulse, before the action commences.

Conditions of Impulse. — While nervous constitutions, tension, and excitation furnish the physical basis of impulse, we may say with Höffding: "The psychological condition of the impulse is, that with the momentary feeling and sensation should be combined a more or less clear idea of something which may augment the pleasure or diminish the pain of the moment."

To illustrate the above statement, we may suppose a mother hearing a noise in the room above her. A sensation is caused, directly fitted to start into action a latent maternal impulse. This noise and the resulting sensation are followed by the vague idea of a child in danger. Without stopping to deliberate, or to think for one second of an alternative course of action, she rushes upstairs to set at rest her painful apprehension, or to escape the torment of uncertainty. Frequently the idea connected with impulse is much more vague than this. We are sometimes haunted with a painful sense of having forgotten something, we

cannot tell what, and we impulsively return to find out, and thus rid ourselves of such an uncomfortable state of consciousness.

Expressed briefly, the conditions of impulse are (1) certain nervous and mental tendencies, natural or acquired, and (2) *one* idea more or less vague, suggesting an action fitted to gratify these tendencies.

The fact that impulse has only *one* idea, allowing no deliberation, must be noted. If the mother had stopped to reflect on the cause of the noise, to wonder whether it was due to a burglar or a child, to deliberate whether it would be better for her to go upstairs or to send some one else, — even if she had finally gone herself, — the action would not have been due to impulse, but to a *deliberative* act of will, where there was *alternative choice* between different actions suggested by different ideas clearly represented to consciousness.

Instinctive Action.

Instinctive Action is Complex and Purposive without Foresight of End. — Whenever a conscious sensation, due either to external or internal stimuli, results in purposive action toward a given end which is not foreseen, that action is instinctive. A young stork left alone in a northern latitude would migrate southward on the approach of autumn. Sensations of cold would furnish the stimuli prompting instinctive action. If the bird had never been south before, it could have no idea of the purpose of its flight, although it would be action directed toward an intelligent end. Certain sensations of organic origin prompt the young bird to build its first nest. This bird has never been taught, nor has it had any experience of, nest-

building. Yet the first nest is constructed on the same principles and fashioned as well as any of its successors. All the actions — the spreading of the wings in flight, the gathering of grass, straw and twigs, the moistening of the bill for making mud — are a series of complex movements blindly directed toward an intelligent end.

Instinctive Compared with Reflex Actions. — Instinct has much in common with reflex action. Whenever certain stimuli are present, definite unvarying actions tend to result in both cases. We saw that a sensory stimulus on the side of a decapitated frog was followed by a definite action suited to remove the cause. When the caterpillar feels certain stimuli, it mechanically begins to weave a shroud in a blind, reflex way, and the action is continued so long as the stimuli are operative. If a stork is confined in a cage with iron bars, so strong as to shut off hope of escape, when the stimulus of autumnal cold affects the bird, it will repeatedly dash its breast against the bars until it is bloody. The stimulus of cold here tends to excite reflex action. Darwin says that a young salmon kept in a tub of water will often leap out at a certain time, and thus commit unintentional suicide. Here, a certain stimulus caused the reflex muscular act of jumping. These facts have led some psychologists, like Spencer, to call instinct a compound reflex.

The difference in the two types of action is, in some instances, very marked. (1) There is a difference in complexity. A reflex movement is simpler and does not generally involve the whole body in action. A limb may be moved; an eye winked; one muscle contracted. When a bird builds her nest, the instinctive tendency results in movements of wings spread in flight, ocular search for

materials, alighting, seizing them with either bill or claw, carrying them to the proper place, and fixing them in position. Here the instinctive movements constantly change, and the one is not a mere repetition of the other.

(2) There is a difference in the remoteness of the end to be gained. A reflex act is usually directed toward some immediate purpose; but an ant will hoard grain for the winter, and the caterpillar provide for a butterfly existence.

(3) There is a wider, if unconscious, intelligence in instinctive acts. Bees construct larger cells for young queen bees and feed the royal larvæ with more and richer food, although there is originally no difference between them and the larvæ of the workers. Simple reflex tendencies would result in making all cells the same to start with, and in feeding all the young in the same way. Hence, some call all instincts examples of "lapsed intelligence"; that is, the actions were at first the result of a highly voluntary process, but from continuous repetition they became unconsciously habitual.

(4) Within a given time, instinct is subject to more change than are reflexes. In the South Sea Islands a species of bird accustomed to build nests on the ground, placed them in trees after cats were introduced. Chickens will at first instinctively follow the call of a hen, but if they are kept away from her for a week, her clucking will not react on them in the same way, and they will refuse to follow her. This change leading to the selection of an alternative course of action, takes us a step forward toward the higher exercise of will.

(5) Instinctive action is begun under the prompting of richer conscious feeling, while there is generally no change in conscious experience going before a reflex action, but

only as a resultant of it. The sensation of cold causes the stork to feel consciously miserable before it migrates. Prior to instinctive action, there is probably always a vague conscious feeling of being out of harmony with the surroundings.

Instinctive Compared with Impulsive Actions. — (1) Instinct differs from impulse in having no idea of the end of the action. When the young salmon leaped out of the tub, there was no idea of purpose in the action. We have seen that impulse is marked by the presence of a more or less vague idea of the object of the action.

(2) Instinct is more complex than impulse. An impulse is preceded by one idea, and usually discharges swiftly along one given line, disregarding any alternative action. The beaver may make a hundred preliminary movements before he actually begins the construction of his dam.

(3) Instinct is more remote in aim. Impulse tends toward immediate gratification and away from present pain. Instinct urges the bee to labor hard to gather honey against the time when the flowers will be gone.

(4) Impulses vary much with individuals, while instincts are common to a species. For example, some persons have a strong impulsive tendency toward sensual gratification, the pleasures of the table, or strong drink. Others are impelled toward intellectual pleasure; when a book of travel, biography, or science is mentioned, they immediately have an impulse to find out the facts which the work contains. All the duck tribe instinctively love the water. Instinct does not admit of individual variation on a large scale.

On the other hand, instinct and impulse have some factors in common. (1) Neither action is the product of

deliberation. It never occurs to the swallow to weigh the reasons between staying north all winter and flying south. Impulsive action knows no alternative and no deliberation. It may be objected that impulse does not always flow out in action, that we sometimes deliberate whether it is better to act or to refrain from acting, that we image beforehand the consequences of a rash action and thus restrain it. This is true, but such actions are not impulsive; they are the products of the highest form of deliberative will. An impulsive action may in time come to be deliberately willed, just as the caterpillar may take on the higher form of the butterfly. All mental powers illustrate growth toward complexity.

(2) After instinctive action has been once performed, a certain amount of foresight of the end must remain in memory. The hen that has once kept eggs warm until they have hatched, must have a certain idea of the result of the action when she again sits. By the law of contiguity, the association would run straight ahead to the chickens. Hence, instinct is like impulse after a certain amount of foresight has been gained in connection with any action. This cannot, however, be said of the first performance of any instinctive action, nor can it ever be maintained in such cases as when the animal dies or changes its form after an instinctive act. The silkworm never has an idea of the end in weaving its shroud.

Human Instincts. — Human beings are especially rich in potential or germinal instinctive capacity, but this for the most part needs to be developed by education and experience. The infant instinctively reaches out his hand toward things, grasps them, or turns his head toward them. In short, a child has an indefinite number of

instinctive movements, but he cannot correlate them in walking or swimming without experience or training.

A human mother does not need to be taught to love and shield her child; but human beings have comparatively few fully developed instincts because reason constantly suggests new acts to meet varying emergencies. When a principle of change is introduced, an instinctive act is no longer certain, and it is not always desirable. When the climate changed in various parts of the world, the strongest animals frequently perished, as is shown by their fossil remains. Man possessed the power of progressive reasoning, which enabled him to change his instinctive acts to meet changing exigencies. Human actions are to-day instinctive ones, broken up into parts and then recombined under the laws of imagination, thought, and will, to meet the constantly varying requirements of civilized life.

Summary of the Chief Features of Instinctive Actions.— (1) They are prompted by intra- or extra-organic stimuli. (2) The resulting movements seem intelligent, because they have a direction that shows a plan. (3) They resemble reflexes in being the unvarying result of certain stimuli. (4) They are unlike reflexes, in being: (*a*) more complex, (*b*) more remote in aim, (*c*) more broadly purposeful, (*d*) more subject to modification or change, (*e*) preceded by more conscious feeling, (*f*) more rich in furnishing complex acts which can afterwards be separated and combined by deliberative will. (5) They agree with impulses: (*a*) in lack of deliberation, (*b*) in foresight of end after the same instinctive acts have been repeated. (6) They differ from impulses: (*a*) in having in their first performance no idea of the end of the action; (*b*) in being less simple and in embracing more acts to achieve the given end; (*c*) in the

promptings lasting for a longer time; (*d*) in being more uniform in regard to the class. (7) Complex instinctive acts, in the case of human beings, have been (*a*) split up into simpler parts, and (*b*) recombined into new forms to meet the changing needs of progressive life.

Higher Deliberative Action.

The Factors. — Higher voluntary processes are marked off from actions of a lower order: (1) by a distinct idea of the end of the action, (2) by desire, (3) by consciousness of alternatives which afford an opportunity for choice, (4) by deliberation, (5) by a feeling of voluntary effort, or by sensations due to muscular movement as a resultant of such effort.

Voluntary Attention. — The first step toward the development of will lies in the exercise of attention. There is a sense of conscious effort in voluntary attention. This suffices to mark it off from the involuntary type. When there is a flash of lightning, we attend involuntarily; when we look into a microscope to discriminate between the atoms seen floating there, we put voluntary effort into our attention.

Ideas grow in distinctness and in motor power as we attend to them. If we take two ideas of the same intensity and center the attention upon one, we shall notice how much it grows in power. Take the sensations from two aches in the body and fix attention upon the one. That idea will grow in motor power until we may act in a direction supposed to relieve that special pain, while the other is comparatively neglected. If we, at the start, want several things in about an equal degree, whether a bicycle,

a typewriter, or a cyclopedia, we shall end by wanting that the most on which our attention has been most strongly centered. The bicycle idea may thus gain more motor power than either of the other two; or, if we keep thinking how useful a cyclopedia would be, action may tend in that direction.

It is a matter of dispute whether will power is anything more than voluntary attention; whether all that is necessary in voluntary effort has not been achieved, when the mind has been kept filled with the idea, until action results as a natural consequence. There is no dispute over the fact that such attention is the most important element in will. In order to act in the direction of one idea in preference to another, we must dismiss the one and voluntarily attend to the other. The motor force thus developed in connection with the dominant idea lies at the foundation of every higher act of will.

Different Types of Higher Voluntary Movement.— I. There is movement started by an *immediate sensation.* When we see a hornet or an angry bull coming toward us, when we touch something clammy in the dark, we at once resort to varied voluntary movements, which our reason tells us best fit the exigencies of the situation. In the case of the hornet, we may endeavor to kill it with a book, or we may quietly depart. To escape the bull, we may climb a fence or a tree, or seek shelter in a building. We may get a light, to discover what object felt so clammy. The point is, that each one of these movements had its origin in an immediate sensation.

II. Movements are also initiated by *represented ideas.* We are sitting quietly in a chair, when we think of a book in the next room. We rise and get the book. Were it

not for the presence of the idea of the book, our action could never take that special direction. The greater variety of ideas a man has, the more numerous are the courses of action open to him. If an intelligent physician has an idea of twenty-five different methods of treating rheumatism, he may vary his treatment accordingly, and may succeed where a less skilled doctor would fail. If a business man has a dozen ideas to fit a given emergency, he may act in any of those directions; if he has but one idea, he can act but in one direction. Ideas must precede to open a path for intelligent action. Before Columbus sailed, he had an idea of land beyond the seas. When discussing the imagination, we saw that even a plumber must have an idea of how to make a short cut for his pipe, before he can do it.

Motor Aspect of Ideas. — An idea always has a motor element, however obscure; in other words, an idea is partially incipient motor action. We have already seen that when a sensory nerve transmits excitement to the brain, there is a tendency to a reflex discharge along a motor nerve. Whenever a definite idea is formed, there is also a tendency toward action. This is most plainly seen in those ideas which suggest some particular movement. The idea of handshaking often goes out in action in the case of a well-bred person, when it is improper for him to take the initiative.

A motor idea, unless restrained, tends to go out immediately in definite action. A person was asked to pass the pepper caster. The motor idea caused an immediate response, although he knew that the top would come off. The caster was shaken and the top came off, ruining the food. The request for the pepper affected consciousness,

raising a motor idea which led to conscious reflex action. All that deliberation could have done in this instance would have been to restrain the passage of the motor element into that form of action.

Muscle Reading. — Every mental state tends to express itself in the appropriate habitual action. This is the foundation truth for the art of muscle reading. A skillful interpreter of muscular contraction will tell where an article is hid, or whether he is about to touch the right article or not, by feeling the muscles of the person taken along in the search. The mental state of the most honest person tends to mirror itself in the muscles. The idea, we have seen, is the mind in action, and a portion of this action is transmitted along the motor nerves. If we think of the edible qualities of a peach or of custard, there is a tendency toward incipient muscular contraction in the jaws and toward an increased flow of saliva. If we project the distinct image of a giant, there is either a tendency toward opening the eyes wider, or toward movement in the muscles of the eyes if closed.

Suggestion. — Action following an idea thrown into the mind, as it were, from an external source, is said to be due to suggestion. A soldier was carrying his dinner to the barracks, when some one yelled "Attention!" at him. This word developed motor ideas which immediately passed into the actions usual when such a command was given. Down came the soldier's hands, and he dropped his dinner. Every idea suggested to us tends to pass into action. The reason why action does not follow every idea, is because the mind leaps ahead, foresees the consequences, and restrains the movement. The effects of ideas are similar

to those of a stone thrown into a lake. The stone does not disappear without leaving an effect behind. The ripples spread in all directions from it. In the same way, motor waves flow out from ideas.

Hypnotism has taught us much about the motor power of suggested ideas. The subject will perform almost any possible action that is merely suggested to him. He will dance, sing, crawl on all fours, act the part of a king, a clown, or a barber; in short, his acts will vary in conformity to the ideas suggested by the operator. Were it not for the certainty of these facts, one would naturally believe it impossible for mere ideas to have such motor force. Such experiments have also shown that the field of deliberative will is much narrower than was formerly supposed.

Although in hypnotism the term "suggestion" is generally used of an idea implanted from without, in normal association we say that one idea suggests another. When no one is speaking to us, we may notice a stream of ideas flowing through our minds. One idea could never suggest another by the law of contiguity, were there not a motor force in the process. To this force is due the appearance of the associated idea.

Imitative Action. — When we watch a rope walker, our bodies tend to sway back and forth in imitation. Children imitate even the unpleasant peculiarities of those around them. The law of suggestion shows the reason for this. The movement suggests the correlated motor idea, which naturally tends to flow out in the proper action. A very low stage of consciousness suffices for the development of such an idea — such consciousness as we find in the somnambulist, a hypnotic subject, or an idiot. The capacity for imitation in the lower stages of mental life is

especially important, for the child thus quickly acquires manifold movements. Even if the motor idea thus developed flows out only in conscious reflexes, this has its lasting results in nerve modification. Imitative movements, preceded by desire and deliberative determination to choose and adapt means to end, as in the case of a sculptor, are of a higher order.

Utility of Motor Ideas in Training. — Before one can deliberate concerning different acts, he must foresee that motor ideas, unless inhibited, invariably go out in the proper responsive actions. If this were not the case, not knowing whither the ideas tend, he might as well center his attention upon one motor idea as another. That was a good soldier who dropped his rations at the command, "Attention." He had been well drilled. We feel that we can trust people whose motor response to the right has always been unerring. Sully says: "In training a dog or a child to obey, the object is to induce such a close connection between the rousing sign and the motor reaction that the latter shall follow certainly and immediately."

On the other hand, there needs to be cultivated the power of restraining customary motor action. The soldier would have been a better one, had his power of inhibition been as quick as his obedience; but a joking command was so unusual in his world, that he had heretofore had no occasion to delay in carrying out a command.

In connection with the motor idea present in emotion, explosive action often develops, causing the person to appear foolish or to disgrace himself.

Desire. — At the threshold of each higher act of will stands desire. This is a complex mental state, and it con-

tains the elements of both emotion and will. In every state of desire there is (1) *conscious feeling*, and (2) *conscious tension* which easily passes into action.

All feeling tends to excite desire. Sometimes desire gives rise to intense feeling. In one aspect, desire is feeling; in another, desire is will or an active tension which passes imperceptibly into will. Desire has for its object something which will bring pleasure or get rid of pain, immediate or remote, for the individual or for some one in whom he is interested. Aversion, or a striving away from something, is merely the negative aspect of desire.

Desire Shows Progress in Intelligence. — We have seen that impulse is indefinite; instinct, blind. When we come to desire, properly so called, there must be a definite idea. If a person says, "I desire," the question very naturally is, "What? Do you desire a horse, a bicycle, a boat, a book, a glass of lemonade?" Unless there is a definite answer to the question, desire is not the term to apply to that mental state. If he wants a bicycle, he must have an idea of what a bicycle is before he can know whether he really desires it or not. If a person asks another at dinner if he would like some mulligatawny, the reply may be, "I do not know whether I desire any or not, for I do not know what it is."

The Antecedent to Desire. — A representative image of the thing desired is the necessary antecedent to desire. A child calls for a peach. If the child had never seen nor heard of peaches, he could have no desire for them. If he reached for a peach when first seen, the movement would be reflex, instinctive, or impulsive. Not until a repre-

sentative idea of the peach comes to the child's mind does desire arise. It has often been said that where there is no knowledge there can be no desire, and that desires increase as knowledge widens. A child sees a new toy and wants it. A man notices some improvements about his neighbor's house and wishes them. One nation finds out that another has a war ship of a superior model, and straightway desires something as good or better. A scholar sees a new cyclopedia or work of reference, and desire for it arises. A person returns and tells his friends how delightful a foreign trip is. Their desires for travel increase. Knowledge gives birth to desire, and desire points out a path for will.

Nature of the Idea Causing Desire.—All objects, or ideas derived from them, do not excite desire in an equal degree, for all do not raise the same amount of feeling. Speaking broadly, we may say that desire is proportional to the amount of pleasure or pain represented with the idea. A man would risk himself far more to save his drowning child than to save a dog, because the welfare of the child constitutes a much greater part of the pleasure of the father's life. Similarly a man would exert himself more to save ten thousand dollars than ten dollars, because the larger sum is suggestive of more pleasure. Hence we may also say that action is proportional to desire. A man would make more strenuous efforts to save a limb from amputation than a finger nail.

Desire is not always proportional to the idea of one's own selfish pleasure. Many persons, after forming an idea of the vast amount of earthly distress, desire to relieve it; and the desire goes out in action, as the benevolent societies in every city testify. Here, the individual pleas-

ure is none the less real, but it is secondary, coming from the pleasure of others.

The idea of the *near* often raises a stronger desire than the *remote*. A child frequently prefers a thing immediately, if it is only one tenth as good as something he might have a year hence. A student often desires more the leisure of to-day than the success of future years. Though admonished to study, he wastes his time and thus loses incomparably greater future pleasure when he is tossed to the rear in the struggle for existence. Persons waste their money on lottery tickets, because they promise to bring a fortune more quickly than hard work.

Deliberation the Intellectual Factor in Will. — Let us take a rational human action and see how much deliberation may be involved in it. I wish to leave the city during the heated term. Before I act, I not only have the desire to go, but I must know where to go. I find out the location, the merits, and the defects of a number of summer resorts. Then I proceed to deliberate. A has surf bathing; B is on a mountain and has fine tonic air; C is near by and some of my friends are going there, but the mosquitoes are annoying and will not allow one to take a walk with any comfort; D has fine air and no mosquitoes, but the place is too fashionable and too much given to dress; E suits for all reasons, save that it is too expensive; F would answer, but it is too far off. I then take into my deliberations the possibility of staying all summer in the city. Three hot days come. The nights are so warm that one cannot sleep. I then continue my deliberations about the summer resorts.

Will is necessarily present in its most important aspect

in every act of deliberation. I balance one idea against another. By will power I hold my attention undivided upon one idea; then I dismiss it, and turn my attention to another. I consider the surf bathing of A, the mountain air of B, the annoyances at C, the fashion at D, the expense at E, the distance to F.

Deliberation is a process of both intellect and will; of intellect to represent ideas and compare them, and of will to hold the ideas before the attention or to dismiss them and make room for others. In the deliberative process, the whole man makes himself felt; all his past experiences count. In impulsive action, the momentary state triumphs.

Choice, or Decision. — With reference to the summer resort, deliberation does not end the voluntary process; the act of will is yet incomplete. Something more is necessary than (1) a desire to go, and (2) deliberation about a large number of resorts. My next voluntary step is to choose among the many resorts concerning which I have been deliberating, and to decide to go to one. G satisfies my reason, for the place has sailing and fishing, good walks, few mosquitoes, and moderate charges. I then cut short deliberation and decide to go to G. Decision is a termination of the process of deliberation. Decision always requires an effort of the will. In fact, decision is often the hardest part of the voluntary process. We frequently complain that we cannot make up our minds, and try to get others to decide for us.

Some persons decide like a flash, without much deliberation or effort. They often find themselves in hot water, and the effort comes in trying to escape. It is better to use more energy in deliberating and deciding

than in endeavoring to escape the consequences of rashness. Young people have frequently ruined their prospects for life, because of one decision without proper deliberation.

There are always at least two alternatives in any higher line of conduct, although only one may be rational. Hamlet found himself confronted with two alternatives, "to be, or not to be," and he deliberated in choosing between these. When we face an orchestra, we have the choice of listening to it as a whole, or of selecting some one instrument, such as the first violin, and paying attention to it. In looking at a landscape, we choose certain elements for close inspection. Our world is, therefore, very much what we choose to pay attention to. If we visit the tropics and choose to heed nothing but the venomous animals, the land will be chiefly one of snakes and centipedes; if we look principally at the birds and flowers, it will be to us largely a clime of song and perfume.

Professor Höffding draws an apt illustration from a comedy in which the battle ground of will is well portrayed. Jeppe, a character in the comedy, wants a drink very much. The element of desire here takes its place in the strife. His wife has just given him money with which to buy soap. He knows that she will beat him if he squanders this money. Then comes the second element in the battle, the deliberation over the longing in his stomach and the fear for his back. "My stomach says you shall; my back, you shall not." The wish is at work magnifying the one and minimizing the other. Jeppe tries to terminate the conflict by asking himself, "Is not my stomach more to me than my back? I say, 'Yes.'" With the word "Yes," the third element, decision, is on the field.

Immediate and Remote Factors in Choice. — The immediate factors, as we have seen, are (1) a preceding process of desire; (2) the presence in consciousness of more than one represented object or end, to offer an alternative course of action; (3) deliberation concerning the respective merits of these objects; (4) the voluntary fiat or decision, which seems to embody most the very essence of will.

The remote factors are extremely difficult to select. The sum total of the man is felt more in choice than anywhere else. Shall I read or go to the theater, save this money or spend it for amusement, go coasting or get this lesson, seek good company or bad, do a kindness to another or not, represent things as they are or not? Before a second person could approximate the outcome, he would have to know certain remote factors, the principal being: (1) heredity, (2) environment, (3) education, and (4) individual peculiarities.

Completed Action. — From a subjective point of view, decision may end the matter, but in a practical world decision is of very little account unless it is followed by action. The road to hell is said to be paved with good intentions, or decisions. A good decision never moved a person an inch heavenward. For a completed act of will, there must be action along the line of the decision. Many a decision has not roused the motor centers to action, nor quickened the attention, for any length of time. There are persons who can frame a dozen decisions in the course of a morning, and never carry out one of them. Sitting in a comfortable chair, it may take one but a very short time to form a decision that will require months of hard work. Deciding in this way is very different from laboring wearily to carry

the decision into effect. The decider does not generally realize the amount of effort involved, when he airily declares his intention of performing a certain action.

In our original illustration, I had determined to go to G, but my act of will was incomplete, for I had not gone. The decision was no absolute guarantee that I should go; many things might arise to prevent. I might hear that diphtheria or typhoid fever had just broken out there. A friend might insist on my visiting him. Some unforeseen business might develop to claim my entire attention in another direction. In the comedy alluded to in a preceding section, Jeppe's decision to drink might not have been carried into action, had he seen his wife waiting for him with a club in the alehouse door.

Some persons can never seem to understand that resolving to do a thing is not the same as doing it. Such are utterly worthless in this world of action. They talk; they feel; they do anything but act. They appear to derive almost as much comfort from resolving to answer a letter, which should have been answered two months before, as they would from actually writing the reply. There may be desire, deliberation, and decision; but if these do not result in action along the indicated line, the process of will is practically incomplete.

Inhibition. — Inhibition is that power resident in nerve cells or in ideas, whereby one cell or one idea can restrain or divert the customary action of another. If every motor idea went out in action, the individual would soon perish. A person may desire to pursue a course of action, immediately pleasurable but remotely hurtful to the system. Unless there is restraint in this direction, the self will be weakened or destroyed. Again, an action already

begun must often be left incomplete. If the completion of a step would place us on a rattlesnake, a centipede, or in a pitfall, we must be able to stop the action instantaneously. Inhibition is thus as necessary as the initiation of action.

A sensory current may flow into the brain and tend to start action in a given direction, but if the outflow along the usual line is repressed for a second, this energy, denied the usual outlet, may overflow and affect an inhibitory center, thus starting that into action. The result of developing this opposing force may be equilibrium, or action in an opposite direction. Sometimes we seem voluntarily to innervate cells which excite opposing muscular movements, as in the case of holding a hand still while a splinter is withdrawn. At other times all our energy seems to be directed toward ideas, as when we endeavor to keep ourselves from thinking of an insult, or of accidents which may befall our friends on a journey.

Inhibition and Memory. — The memory of a past state of consciousness often tends to inhibit an action that would reproduce that state.

The mere sight of a thing tends to awaken in older people, as well as in children, a motor prompting to touch it, or to make some movement, such as turning the head. In other words, the sensory sight stimulus tends to pass out in motor action. If a child has touched a hornet and been stung, the memory of the past resulting condition of consciousness will tend to repress motor inclination to touch the hornet again. A person comes into our room, catches sight of a pen or a pair of eyeglasses, and begins to twirl them or strike it against the table, until the motion makes us nervous. Most of us feel a tendency to do such things. With some, however, inhibiting factors

arise: (1) When we start to do one of these objectionable acts, there flashes into consciousness a memory of our feelings when some one served us that way. This state of consciousness tends to arrest the motor inclination to seize the pen. (2) If we care nothing for the feelings of others, or are too stupid to remember how we felt on a similar occasion, there may arise a memory of formerly breaking something and having to pay for it. The remembrance of this disagreeable association will tend to inhibit the movement.

Inhibition and Deliberation. — Deliberation is a very important factor in inhibition. For this purpose we must summon other ideas, especially those representing the consequences of the act and suggesting other courses of action. If a man insults me, the idea of knocking him down may rush into my mind and be followed by immediate action. But if I can summon an idea of the publicity which such an act would cause, of the newspaper item, of the fact that I am living where brute force is not supreme; if I can form the idea of an alternative course,— dignified silence, and completely ignoring the speaker, — deliberation may show me that the latter alternative is the better. Here, the force generated by the ideas is not lost, but diffused through all the muscles, and it may raise the temperature of the entire body. The nails are often pressed into the palms, the jaw firmly set, the face flushed. The will also expends a portion of the motor energy in summoning ideas of the consequences of the action, and holding those ideas firmly before the mind while the thinking power deliberates.

Reflexes, impulses, and instincts tend to rush into action before deliberative inhibition can be applied. The act is finished before an idea of the consequences flashes into

consciousness. A master stroke in the inhibitory battle is to attend to an idea that suggests an opposing action. A drunkard, on his way to a saloon, thought of the misery of a sick child at home. As the idea grew more vivid, his steps became slower. Finally he stopped, turned, and went homeward.

Inhibitory Power a Comparatively Late Development. — Inhibition makes its appearance only with education and experience. Animals, young children, and savages restrain few actions. If the tail of a cat is pinched, the customary action will follow. If the feelings of a cultivated person are hurt, there will often be no outward sign. If food is placed before an animal, it will gorge what it can and trample on the rest. In the same way, many young people cannot inhibit the tendency to waste time and trample on their golden opportunities. The effort of a developed will is nowhere more marked than in inhibition.

The Direction of Will. — A very little reflection will suffice to point out two different classes of objects toward which the will acts: —

I. The will goes out in *muscular movement*. My foot is still; I will to move it, and motion follows. I am falling; I will to catch at something, and my arms are immediately moved. The will is almost always expressing itself in varied muscular action. In all these cases, will power seems to flow out from the brain toward the muscles. In emotion, the will often actively represses the natural muscular movement.

II. The will is directed inward upon *mental processes and objects*. (1) The will appears in perception in the form of attention, holding the mind on the object while

the intellectual process in perception is completing itself. (2) The will is active in representation or recall. Suppose we have two ideas, A and C, before our mental gaze, and are searching for the idea connecting them. A throng of ideas comes to our minds, say L, T, Y, etc. The will dismisses these to make room for others, until B appears, when it is detained. This shows the voluntary process by which we search for lost ideas. (3) The will shows special activity in thought. Consciousness is not made up of isolated ideas, but of ideas woven together by thought in the conscious mind. Weaving implies activity, and will is behind that activity; hence will is necessary to correlate the facts of consciousness. In comparison, the will is busy fixing the attention, and in dismissing and retaining ideas. (4) The will may be active in emotion, either in excitation or repression. Ideas are detained to fan the flame of feeling, or they are dismissed, and others that tend to repress it are summoned.

Will and Motive. — In the higher type of action, the will can go out only in the direction of an idea. Every idea which becomes an object of desire is a motive. It is true that the will tends to go in the direction of the greatest motive, that is, toward the object which seems most desirable; but the will, through voluntary attention, puts energy into a motive idea and thus makes it strong. It is impossible to center the attention long on an idea, without developing positive or negative interest, attraction or repulsion. Thus does the will develop motives.

We may state as a law the fact that the will determines which motive shall become the strongest, by determining which ideas shall occupy the field of consciousness. We have seen that emotion and desire arise in the presence of

ideas, and that the will has influence in detaining or in banishing a given idea. If one idea is kept before the mind, a desire and a strong motive may gather about that idea. If another idea is called in, the power of the first will decline. The more Macbeth and his wife held before themselves the idea of the fame and power which the throne would confer upon them, the stronger became the desire to kill the king, until it finally grew too strong to be mastered. They were, however, responsible for nursing the desire; had they resolutely thought of something else, that desire would have weakened. A person might keep a lion cub, feed it, and nurture it carefully. If warned of the danger, he might reply: "See, I can throw this cub clear across the room. I can kill the whelp with one blow of this iron bar. I am too strong to fear." He continues to feed the cub, and it finally becomes so strong that it attacks and kills him. This is precisely the case of him who feeds a bad desire with the fitting ideas. It may some day master his will.

Simple and Complex Action. — When a child sees a red apple and reaches out to grasp it, the action is simpler than that of a grown person who wonders if the apples on a certain tree in the orchard are ripe, and starts out to investigate. There was no apple before him to incite him, but only the image or memory of one. The presence of images guiding action renders it more complex, for there are representative elements instead of present objects.

An example will serve to show what a complex product action may be. A person decides to take a European trip two years hence. He at once begins to collect books to read about the points of interest in the countries he proposes to visit. Perhaps he economizes in various ways

so as to have sufficient money for the trip. He studies the more common forms of expression in certain foreign languages. In this way, numerous acts come in as auxiliaries to the main act of taking the trip, and each of these acts may call into play many representative images.

Certain elements are necessary in a case of complex will before we come to deliberation or decision. Suppose that we are sitting in the house and decide to go into the garden to eat some grapes. There must have been: (1) former perception of grapes; (2) memory of the grapes and of the garden, together with a recall of former pleasure in connection with them; (3) the resulting desire.

Human action increases in complexity as experience widens. A child may be but little moved at the prospect of some pleasure promised for a month hence. A man will plant a tree, although he knows that he cannot eat the fruit for years. The will of the child is as immature as its experience. When some pleasure is denied or a toy broken, the child gives itself up to uncontrolled tears. Children frequently do wrong, though certain to be punished when they are detected. Their experience has not taught them to curb action in view of a distant result. Sometimes older persons do acts for which they believe they must be punished in the eternal courts of justice, because the morrow of death seems so far away. When we save for the morrow or for old age, our actions are due to the complex representations of experience. The same is true when a student masters knowledge in order to have it at his disposal in the years to come.

Development of Will. — Will is only a potential capacity in a child, very much as the roots of a tree are in an acorn. For some time his movements are reflex, impulsive, or

instinctive. He remembers these, repeats them again and again, and is then ready for the next step. The will grows as much as the other mental powers.

The first step in the development of will consists in getting *control of the muscles.* What we call our ego, or self, is surrounded by a network of muscles which we must learn how to use. The will receives its first development in connection with these. The muscles are, in the beginning, more difficult to control than a bicycle, or the keys of a piano, for a beginner. When a child learns to write, the muscles take the pen precisely where he does not wish it to go. His whole face and tongue tend to move in connection with his arm and fingers. The will all the while gains more and more control over the muscles, until they finally respond to its slightest prompting with wonderful definiteness. A young quail, on leaving the shell, can run swiftly and avoid objects with precision; but in the case of the human species, these muscular movements are whetstones to sharpen the will for the more varied struggles of life.

Motor imagination is an ideal combination of past movements into a new and more complex product. Just as the sewing machine is the product of a new combination of well-known metals and mechanical principles, so are the movements in swimming a combination of simpler movements of arm and leg, which have been previously tested. The will here makes the movements fit into the ideal forecast. Motor memory gradually becomes so definite that one can tie a necktie, play the piano, or write correctly, in the dark. Each exercise of motor memory and imagination shows that the will has conquered new territory, and is master of a more complex product, which is required for the labyrinthine movements of life.

The will often has a severe task in separating the different elements of a complex motor presentation, for new combinations of the motor imagination. To illustrate, there is a tendency, in the first motor presentation, to move the entire hand in one way; but in learning to play the piano, the varied movements of which the hand is capable must be separated. One finger must be moved in one way; another, in another way. Then there must be harmonious combination of these separated movements to produce the right notes in order. A child learning to write often finds it hard to separate the movements in the fingers from those in the tongue and lips. This is a much severer task for the will than to separate ideally the branches from a tree, the head from the body, or the wings from a bird, for here the imaginative forecast must be made a reality; hence the will has to control both idea and muscles.

The second step in the development of will consists in *controlling ideas.* Attention is the chief power in a developed will. Attention puts vigor into an idea, motor vigor as well as other power. The will thus enables some ideas to fight their way to the front, and relegates others to the rear by withdrawing attention from them. The person who can do this with ideas as they come has a highly developed will. Attention is, at first, fugitive and involuntary. Later, the child strives to attend in a desultory sort of way; but any slight outside stimulus, as the entrance of a dog into the room, causes his will to relax its grip on the ideas in the lesson, and his attention flits elsewhere. Not until ideas can be held firmly before the mind, even when the provocation is great to let them slip away, is the will developed on its most important side. While this voluntary power can be gradually acquired, it

is nevertheless a fact that only the few, the successful ones in life, ever have a highly developed will.

Conscious Elements in an Act of Developed Will. — (1) Antecedent to higher voluntary action, we are conscious of either a sensation or a represented past sensation. Before we start to shut a window, a present sensation may affect us, — we may actually see rain, mosquitoes, or dust coming in. Or the memories of past sensations due to toothache, cold in the head, or rheumatism, may precede the act of shutting the window. In either case, the first conscious element is a sensation, present or remembered.

(2) Before we start to shut the window, we must have an idea of what we intend to do. The idea of the end is the second element in consciousness. Were this not the case, a sensation might prompt us to do any one of innumerable unrelated acts. Instead of shutting the window, we might brush our teeth, take off our shoes, lock the door, or lie down.

(3) Preceding action, there is a vague feeling of more or less mental, muscular, or nervous power. This conscious sense of power, even when we are not actually engaged in willing, is popularly expressed by, "I feel as if I could (or could not) do that now."

(4) After voluntary action, there is a conscious sensation due to muscular movement. It is a disputed point whether we are conscious of a stream of effort flowing into a motor nerve, or whether we are only conscious of an affection resulting from a stream flowing in from a sensory nerve. The relation of consciousness to our nervous mechanism is very obscure. A paralytic seems to have a sense of effort in trying to move a limb, when its muscles do not stir.

(5) In attention centered upon ideas there is a sense of effort, sometimes pleasurable, sometimes painful. It is a tremendous effort for a schoolboy to center his attention on his lessons, when he knows his companions are waiting for him outside. Attention causes a change in cerebral blood supply and in brain cells. These changes probably contribute additional elements to consciousness.

Tendency of Higher to Lapse into Lower Voluntary Acts. — After we have with difficulty performed a voluntary act several times, we notice that new repetitions gradually begin to grow easier, that they are attended with less conscious effort. In some cases this effort disappears entirely from consciousness, and the action after the initial start seems to go on of itself. Walking was to us all once an art, which seemed to require the skill of a wonderful juggler. Now, after we have once started our legs, we pay no further attention to their movements until we voluntarily stop them. During this time we may be talking on a subject that requires all our voluntary attention. We are conscious of our muscular movements only in a reflex way. The movements of the fingers in playing the piano at first take all the will power at our disposal. Later, we can use our will in another direction, and our fingers continue to strike the right keys.

At first our wills often have a serious task to keep the attention on new and difficult subjects; but after repeated attempts, it seems to fall and rest there as easily and naturally as snowflakes on the ground. At first it may be a task for a tradesman not to misrepresent an article; but if he perseveres, he will tend to become unconsciously honest from force of habit. Or, if he has, at the outset, a struggle with his moral sense in deceiving

customers, he will soon come to practice deception without an effort.

There are two laws governing such cases as the above: (1) An action tends to recur, and to become easier with each performance. (2) Actions, at first voluntary, after frequent repetition, either take less hold on the conscious attention or they produce only a subconscious effect.

To account for this, Professor James formulates this law: "An acquired habit, from the physiological point of view, is nothing but a new pathway of discharge formed in the brain, by which certain incoming currents ever after tend to escape." This law has neither been proved nor disproved, but it is probably broadly true, in so far as it relates to some peculiar nerve change due to repeated acts. It is, however, not necessary to suppose a new path of discharge. A molecular change in the nerve structure of the old path might serve equally well. Then the currents might glide along with so little friction as just to graze consciousness as a reflex act, or the friction might be so slight as to arouse no consciousness.

To illustrate the two hypotheses, we may suppose a lake subject to a rise from freshets. The waters flowing through the outlet may inundate the surrounding country. A new and broader outlet may be made, which will easily carry off the water, or repeated freshets may so deepen the first outlet that the water may be carried away beneath the surface level of the land. Here, the inundation corresponds to consciousness filled with the sense of voluntary effort. The unconscious acts of habit are like the outflow in the deepened channel, without the former inundation.

Will and Character. — What has the will to do with character? Character is largely a resultant of every voluntary

act from childhood to the grave. We gradually make our characters by separate acts of will, just as a blacksmith by repeated blows beats out a horseshoe or an anchor from a shapeless mass of iron. A finished anchor or horseshoe was never the product of a single blow. A man acquires character by separate voluntary acts. We apply the term "conduct" to those actions unified into a whole, which relate to the welfare of the self, either directly or indirectly, through the welfare of others.

Character is a resultant of several factors — will, heredity, and environment. Let us take an actual case to represent these at work. Shakespeare was born of parents who could neither read nor write. There was something more in the boy than in either of them. A part of that additional something was due to his will, which, by always acting in a definite way, often in the line of the greatest resistance, gave him stability when others were wavering like reeds in a wind. Unlike Marlowe, Shakespeare was not killed in an alehouse, although he must have felt promptings to waste his time and nervous force there, as did so many of his fellow dramatists. In resisting these tendencies, in putting the best of himself, not into revels, but into his dramatic work, he acquired character. That heredity was not all in his case is shown by the fact that he had brothers and sisters, who never climbed the heights with him. His limited early opportunities show that environment was not all that made him. Besides, environment did not make Shakespeares out of others born in that age. There was will power in him that rose above heredity and environment, and gave him a character that breathes forth in every play.

The modern tendency is to overestimate the effects of heredity and environment in forming character; but, on

the other hand, we must not underestimate them. The child of a Hottentot put in Shakespeare's home, and afterwards sent away to London with him, would never have made a Shakespeare; for heredity would not have given the will sufficient raw material to fashion over into such a noble product. We may also suppose a case to show the great power of environment. Had a band of gypsies stolen Shakespeare at birth, carried him to Tartary, and left him among the nomads, his environment would never have allowed him to produce such plays as he placed upon the English stage.

Heredity is a powerful factor, for it supplies raw material for the will to shape. Even the will cannot make anything without material. Will acts through choice, and some kinds of environment afford far more opportunities for choice than others. Shakespeare found in London the germ of true theatrical taste, already vivified by a long line of miracle plays, moralities, and interludes. In youth he connected himself with the theater, and his will responded powerfully to his environment. Some surroundings are rich in suggestion, affording opportunity for choice; while others are poor. The will is absolutely confined to a choice between alternatives.

Character, then, is a resultant of will power, heredity, and environment. A man cannot choose his parents, but he can to a certain extent determine his environment. Shakespeare left Stratford and went to London. He might have chosen to go to some insignificant town where the surroundings would have been uninspiring. In middle life a man's decisions represent his character. He will be swayed by the resultant force of all his preceding choices; in other words, by his character.

Some years after leaving school, a young man approached

a classmate and said: "I want you to come into a profitable partnership with me. I have learned the intricacies of a certain peculiar line of trade, where I see a chance, because of my special knowledge, to pick up bargains almost every week. I have not the capital for this. You furnish that, and we will divide the profits."

The classmate, afterward mentioning the affair to a friend, said: "I did not go into partnership with him, for he had no fixed character. Even in school he would sometimes tell the truth and sometimes not, sometimes study and sometimes cheat his way through. His knowledge and capacity for making money in that line are undoubted, and I am sorry that he has not character enough for me to join him, but I could not be certain that he would not misrepresent the cost of the articles purchased. Again, I am not sure whether he could be depended on to stay sober. I know that I am the loser as well as he, because he has no character."

Freedom in Willing.

True Conception of Freedom. — All persons agree that there is no such thing as unrestrained liberty. Every human being is, from the cradle to the grave, subject to external restraint. If a man declares that he is free to go without food, air, or sleep, and tries to act accordingly, consequences will soon deprive him of that liberty. The circle of freedom is much smaller than is sometimes thought; the fish is never free to become an eagle. Human freedom may be likened to a vessel sailing up a river. Her course must be kept rigidly within the banks; she cannot sail on the dry land; but by tacking, she can make headway up the stream in the teeth

of the wind, and she can stop either at this town or at that. The popular belief seems correct, that the sphere of freedom is sufficiently wide to allow a man scope enough to keep him busy for several lifetimes.

Freedom consists in being able to choose between two or more alternative courses of action. A stone is limited to one course and is subject to an unvarying law of gravity. Exclude the power of choice, and all freedom is gone. If we have the power of alternative choice, we are within certain limits free. These limits vary. If I am educated so that I know how to do several different things in the higher walks of life, I can choose any of those things. If I am ignorant and can perform only cruder tasks, my capacity for choice is excluded from higher lines of action.

Some deny that human beings have any more freedom than a stone. The discussion of the freedom of the will properly belongs to metaphysics, but the question is one that so vitally concerns our mental lives, that we shall here consider the question very briefly.

Difference in Mental and Physical Causes. — Spontaneity is the power of originating movements within the self. If we look at a protozoön, we shall see it occasionally make movements due to no external cause, so far as we can learn. The capacity for movement is within the body. These movements are of a higher type than those in a stone, but they are strictly conditioned by the nervous system. Spontaneity differs from the power of alternative choice, because such a movement, though self-originated, knows no possibility of choice.

With matter, there is uniformity of cause and effect to a degree not observable in mind. To-day I see lying

upon the table before me a penknife. I pick it up and open a blade. To-morrow I see the same knife, but do not pick it up. There is plainly here not the uniformity of cause and effect to which we are accustomed in physics. Again, in the mental world, action is not proportional to the intensity of the stimulus. An entomologist in a forest might listen to the chirp of a cricket, but not heed the louder caw of a crow.

Deliberation comes in to check the flowing of a cause into its effect. The operation of a mental cause is thus often stopped or deflected. There is nothing parallel in the action of gravity or of physical forces. Will often suspends action. I decide to-day to do a certain thing, but I do not carry the decision into effect for a year. Gravity has not been proved to suspend its action in an analogous way.

Appeal to the Universality of Causation. — Some modern philosophers say that it is unphilosophical to believe in the freedom of the will, since the law of the universality of cause and effect here meets with its first and only exception. There is no such universal law. If we run back sufficiently far along the links in the chain of causes we must come (1) either to the first link, or (2) to the conclusion that the chain is infinite. Under the first supposition, we have a right to ask what caused the first link, and we receive no answer. On the second hypothesis, there could have been no temporal cause, as we understand it. We cannot suppose a preceding cause to an event which has no beginning. Hence, since the law of the universality of mechanical cause has suffered one exception, there is no *a priori* impossibility that another break may be found somewhere in nature.

Attention and the Motive. — In the capacity for attention we have the key to the freedom of the will. Voluntary attention makes the motive. The motive does not make the attention. Hence the motive is a product of the will. If I withdraw my attention from a motive idea, it loses vigor, like a plant deprived of air and moisture. We have already shown this fact at sufficient length. By sheer force of will power, many a one has withdrawn his attention from certain temptations, centered it elsewhere, and thus developed a counter motive.

Testimony of Consciousness. — We hear it daily said that some one was foolish in following one line of action in preference to another. We never make the same remark about a stone in motion or at rest. When we deliberate whether to accept this offer or that, to follow this vocation or that, consciousness distinctly tells us that we are free to choose either alternative. We feel that we are acting sensibly in deliberating, that it is *we* who are deciding, that we are not the helpless conscious spectators of a decision made for us by brain atoms or outside stimuli. Consciousness never gave clearer, more direct, or more forcible testimony than when saying that we are sometimes free to choose between alternative courses of action.

The opponent of freedom says that consciousness testifies to a falsehood, that she is an incompetent witness and must be thrown out of court. If this is the case, no structure of physical science built solely by the light of conscious reason can be firm. Consciousness may have testified to the truth of repeated falsehoods in physics, astronomy, or botany. Dr. Hyslop rightly says: "I have nothing but the testimony of consciousness to the cogency of the argument for necessitarianism. But if that author-

ity be impeached, I am as much in the dark about that theory as I can possibly be about freedomism."

Remorse, Blame, Duty. — Men have often experienced intense remorse under the notion that they might have acted differently. Thus, Nero felt, when the fires of remorse were lighted, that he was not compelled to murder his mother. Children have often suffered acutely in recalling how they might have treated a dead parent better. If there is no freedom to act differently, why should remorse ever be felt? Remorse depresses the vital energies, and breaks down nerve cells. If a poor creature could not have acted differently, why should he be tortured with remorse? There is no answer to this question, except on the assumption of freedom, for the scientist is compelled to admit that all his investigations are determined by the idea that things have a *purpose*. Remorse must also be held to have a purpose, if only to serve as punishment for moral wrong.

We cannot logically blame another, unless we suppose that he could have acted differently. We do not blame a bullet for killing a man, because the projectile could not help traveling in the path determined by causes over which the agent had no control. The idea of duty is based on the supposition of freedom. Duty often requires us to choose the most difficult and disagreeable of several alternative courses of action.

We thus see that human society is founded on the supposition that man has, to a certain degree, the capacity for alternative choice. Without this fixed belief in freedom, such words as duty, right, wrong, blame, crime, reward, and punishment would disappear from our language.

Hygienic Aspects of the Will.

Effect of Voluntary Attention upon the Bodily States. — It has been known for a long time that if the attention is directed toward any bodily organ, abnormal sensations may be caused in it, and disease may be developed. The renowned Dr. John Hunter said: "I am confident that I can fix my attention to any part, until I have a sensation in that part." Dr. Tuke says that these are "words which ought to be inscribed in letters of gold over the entrance of a Hospital for the Cure of Disease by Psychopathy. Hunter's confident assertion is the more interesting because, drawn from his own experience, it shows that the principle is not confined in its operation to the susceptible and nervous, but operates even on men of the highest mental endowment."

We have examples from the literature of the seventeenth century, showing how the expectation of a complaint will produce it. In 1607 an ignorant English physician told a clergyman's wife that she had sciatica, although there was, in reality, nothing the matter with her sciatic nerve. Her attention was thereby directed to it and a severe attack of sciatica was the result. When a person inexperienced in medicine reads carefully the symptoms of some disease, he is apt to begin an attentive search for those symptoms and to end by fancying that he has them.

Seasick persons have been relieved of their nausea by being made to bail a leaking boat from the fear that it would sink. All their attention was thereby diverted from themselves. Many can recall how children, and grown persons, too, have forgotten all about their alleged intense thirst, as soon as their attention was diverted. Some persons, after eating something which they fancy is

a trifle indigestible, center their attention upon the stomach, expecting symptoms of indigestion, and are often not disappointed. A man who had good reason to fear hydrophobia, determined that he would not have it. The pain in the bitten arm became intense, and he saw that he must have something to divert his attention from the wound and his danger. He therefore went hunting, but found no game. To make amends, he summoned a more inflexible will and exerted at every step "a strong mental effort against the disease." He kept on hunting until he felt better, and he mastered himself so perfectly that he probably thereby warded off an attack of hydrophobia.

According as we center our attention upon one thing or another, we largely determine our mental happiness and hence our bodily health. One person, in walking through a noble forest, may search only for spiders and venomous creatures, while another confines his attention to the singing birds in the branches above. One reason why travel is such a cure for diseases of body and mind is because so many new things thereby come in to claim the attention and divert it from its former objects.

The following expression from Dr. Tuke should be remembered: "Thought strongly directed to any part tends to increase its vascularity, and consequently its sensibility."

CHAPTER XIII.

THE CULTIVATION OF THE WILL.

Habit. — Animals are born with instinct. Habit is the result of acquisition. The most important of all tasks for the will is the formation of correct habits. Good habits are always formed under an effort of will. Weeds alone grow without cultivation.

Man's nervous system possesses, early in life, a rare capacity for modification or adaptability, which renders possible the great variety in human life and effort. The tendencies of the muscles and the nerves to respond to the stimuli of life are altered. This is a known fact, whether it is due to altered molecular arrangement or to some other cause. We may not be able to give a scientific explanation why cloth folds more readily a second time where it has once been folded, but we may accept the fact and act upon it.

Recent psychology has done much practical good in calling attention to the plasticity of nervous matter early in life, and in showing that the longer one defers the formation of a desired habit, the harder will be the struggle required, until finally the task will be practically impossible. The analogy between the plasticity of nerve and brain and that of plaster of Paris has often been pointed out. The freshly mixed plaster can easily be molded at will, as can a youthful brain and nerves. Persons after the age of thirty seldom radically change

their habits; indeed, the age of twenty finds most of our habits already outlined as they are to remain for life. The boor at that age will continue to have boorish peculiarities. Errors in grammar will slip automatically from the tongue. The doctor, the lawyer, the clergyman, the business man, the teacher, soon acquire the peculiar habits of their professions. If we do not get into the right vocation early in life, we are caught in the vise of habits ill-adapted for a change. Our very ways of looking at things have become crystallized. If we put off learning new subjects, we shall remain ignorant of them.

An anonymous writer in Harper's *Bazar* states a truth, the acceptance of which would remove considerable trouble in many cases: "The effort to remodel the character of a grown woman is a hopeless and thankless task, that can only bring misery to subject and operators." Precisely the same thing is true of a grown man. After habit has cast him in her iron mold, the chances of his changing are so slight that they may be neglected in computing his future orbit. Statisticians tell us that, out of a thousand drunkards who try to reform, only three permanently abandon the vicious habit. The rest slide back sooner or later.

These lines of Professor Romanes are worthy a place in the memory:—

> "No change in childhood's early day,
> No storm that raged, no thought that ran,
> But leaves a track upon the clay,
> Which slowly hardens into man."

Formation of a New Habit. — It is possible to frame certain practical rules which will aid one in acquiring a desired habit: —

(1) Put all the motor force possible into the actions

you desire to make habitual. If you wish to remedy a stoop in the shoulders, innervate the muscles as vigorously as possible. Keep firmly in consciousness the motor idea of forcing the shoulders back. If the idea vanishes, recall it, and keep the voluntary act of attention busy. If you wish to repress a habit of constantly clearing the throat, innervate the muscles of the throat, and hold the proper motor idea before the mind.

(2) Allow as few ideas as possible of other things to absorb the attention, while you are laying the foundations of a habit. Will is always definite and has for its object one central idea. This idea should, of course, be reënforced with kindred ideas, such as ideas of the advantages which will in the end result from this habit. Banish all ideas which suggest temptation to break the habit. If a man wishes to give up drinking, he should at first avoid passing a saloon, for it may recall a throng of ideas which would develop a desire too strong to be resisted. He should avoid company that would suggest to him the pleasure of taking a drink. A boy who wishes to form a habit of studiousness ought not, as he starts to get his lessons, to pass through a group of boys setting out to play. They may urge him to come to complete a baseball nine or to join in some frolic, and he may yield.

Many a person has stood firm only because he ran away from dangerous ideas. The companions of Ulysses were wise to stop their ears with wax, so as not to hear the songs of the Sirens. Ulysses heard, and his desire to go to them overmastered him. Had he not been forcibly restrained, he would have perished. Once out of hearing, he was a man again. This fable is applicable to all life. In one way or another, certain ideas must be kept out

of the mind. He only "jests at scars who never felt a wound." Those who have run the gauntlet of strong temptations do not laugh at their power. It takes more effort of will to turn away from some ideas than to face them, and the coward is sometimes he who remains on the scene.

(3) Every time there is a chance, repeat the action to be made habitual. Suppose one wishes to form a habit of mental concentration. He reads one page with tense attention. If he then reads the next six pages with relaxed effort, he is going backward in forming the desired habit. A good habit was never the result of such intermittent effort. There must be continuously the same attention. When the mind gets tired, some other work should be taken up. Only in this way can one progress in forming a good habit. Failure to observe this will cause retrogression.

(4) The beginning of the formation of a habit is a very critical time. No exception must be allowed until the habit has gained considerable headway. The person who smokes a very choice cigar with friends, after he has promised to stop; the drinker who, like Rip Van Winkle, takes another glass, saying that he will not count this one, has not the faintest conception of the law of habit.

The law of invariable association is the foundation on which habit is built. If a person wishing to learn the alphabet said *a*, *b*, *c*, to-day; to-morrow, *a*, *c*, *b*; the next day, *c*, *a*, *b*, — he would never know the letters in any fixed order. From one point of view, habit is association by contiguity, and hence the association must be invariable in order to be depended on. Sometimes persons who will not put things in their places try to cultivate a habit of order. For two days everything is put in place. On the third day

they are in a hurry because they rose too late, and there is the former disorder. If they had realized the seriousness of the situation, they would have been called an hour before time rather than allow an exception to occur the third day. It has been well said that when a ball of cord, which one is winding up, is allowed to fall, more is unwound than many separate windings can replace. So it is with habit; a single omission cannot be remedied in a day or a week. A business man once neglected to keep with some associates an appointment relative to the formation of a new company. He made an excuse that it was too hot. They very properly left him out of the organization, because they wanted only those who could be depended on.

If the above rules are faithfully applied for a considerable time, habit will finally become organic memory. A person can then, without conscious effort, act unerringly in the direction indicated by such a habit. To do a thing improperly will then cause a struggle, because it will be hard to break a fixed habit of doing things right, and the mind will be left free for progress in other directions. The habit works automatically, and the attention can be centered elsewhere.

Deliberation an Essential Factor in the Right Culture of the Will. — No scheme of will culture which does not insist on deliberation is of much account. This does not mean that the same action must be repeatedly deliberated over whenever it comes up. One process of careful deliberation at the outset may be enough. Some persons make every trivial affair, such as deciding whether to go to a picnic or to stay at home, sickly with the "pale cast of thought," but youth is generally too rash to need any

caution in this direction. Action without thought will, in ninety-nine cases out of a hundred, land the doer in trouble, unless the act is the result of a correctly formed habit, which had deliberation at its initial stage.

Many men of great activity have been the most successful of their generation, because their activity has been coupled with far-reaching foresight. Others, with activities equally great, have never recovered from some early rash misstep. Every small panic or fluctuation in the money market catches scores of these men, because they rushed into some investment which a little deliberation would have shown to be unsafe in a state of financial depression. This truth is embodied in the proverbs: "Look before you leap," and "Be sure you are right, then go ahead."

A habit of deliberation in cases of violent emotion is a difficult one to form. When one feels strongly, the motor idea is often followed immediately by motor action. A fit of anger has escaped us before we were aware. We have said something that we shall regret all our lives before we could seem to apply the brakes to speech. The only safeguard against these sudden motor outbreaks is to be continually on the lookout for the provoking causes, and to have the brakes of repression half applied before the cause is operative. The habit of being watchful and of applying motor inhibition will soon begin to form, and the task will grow constantly easier. In other cases, where the emotion is of slower growth, the attention must be drawn away from the emotion-provoking idea before it grows too strong.

The truth is important, that one must learn to think in order to cultivate will power correctly. Man has improved faster than the beasts, because his voluntary acts have been guided by progressive thought toward higher ends.

The Two Factors in the Rise and the Decline of a Tendency to Voluntary Action. — We may call the first the *motor* factor, *i.e.*, that voluntary power which rouses or represses the muscular expression of emotion. We know that animals, barbarians, and children generally allow motor discharge without inhibition, and that control comes in some way or other with culture. With reference to the first factor, Professor Höffding says: "Even if we cannot prevent a feeling from arising, we may possibly prevent it from spreading, by inhibiting the organic movement which accompanies it, and indulgence in which augments it."

The second is the *ideational* factor, and that is the more powerful with cultivated persons, because action grows to be more and more the result of ideas. We saw that the actions of men were grounded upon some desire or aversion. It should always be remembered that desire gains strength from keeping the mind filled with ideas of the desired object, and that desire of forbidden things frequently becomes so strong as to master the will. In such a case, the task of the will is to weaken the desire at the start by withdrawing the attention from the fostering ideas.

Tenacity of Attention. — From what has already been said, it can be inferred that tenacious attention is one of the strongest factors in a cultivated will. Some modern psychologists insist that attention is the only power of the will. Be that as it may, it is hardly possible to overestimate the importance of tenacious attention. A man with half the natural ability of some geniuses often accomplishes far more, because he keeps his attention undivided on one thing until he has mastered it. They might have

learned it in half the time, had they been equally attentive. Their genius scorned the restraint of attention. The butterfly element in their nature demanded a large meadow and many flowers. The movements of a butterfly are quicker and more pleasing to watch than an ant's, but the latter lays up more for winter. Of course when a genius exercises the power of undivided attention, he will surpass those of less ability; but the fable of how the tortoise beat the hare was suggested by the success of plodding attention.

The man who can hold uninteresting ideas before his mind until they gather interest, is the man who is going to succeed. Charles Dickens said that the reason of his success consisted in throwing his entire attention into whatever he happened to be doing, no matter how quickly that might be succeeded by something else.

The only way to cultivate attention is by a *continuous* effort of will. If the attention wanders from any subject for ninety-nine consecutive times, bring the attention back ninety-nine consecutive times. Make an effort to concentrate the mental powers each time. If lack of attention springs from weariness, rest. A habit of attention will surely grow in this way. When a young colt is first broken, he wants to run from one side of the street to the other, to keep anywhere except in the proper place. After the colt has been pulled back many times by the bit, he finally learns to keep the middle of the road. Attention is like the colt. Every young person ought to add to his list of maxims: With all thy cultivating, cultivate attention.

Feeling and Decision without Action. — The easiest way to ruin the will is to suffer emotions to evaporate without

leading to action, to frame decisions and then not act on them. The will and the character are very speedily ruined in this way. From a moral point of view, those persons are exceedingly contemptible who are always "going to do" something, but who never do it; so are also those who "will with reasons answer you" in regard to why they have done nothing.

A remarkably successful business man said he had divided all persons into two classes: those who did what they had promised or were directed to do, and those who returned with some reason why they had not done it. When he employed persons, he always set them a certain hard task at the outset. If they returned with a reason why they had not done it, he dismissed them. In this way he surrounded himself with an unusually fine set of employees on whom he could depend.

After one has formed a decision with the proper deliberation, he should not fail to act on that decision except for a newly discovered reason of the gravest sort. To do otherwise is to sink a mine under the citadel of the will. Musical gratification and novel reading are responsible for innumerable ruined wills. Music often helps to ruin the will because strong emotions are raised and allowed to subside without action. In one of our large cities a lady was recently moved to tears by some piteous operatic music. That week the little child of her cook died. Proper nursing might have saved it. The lady had been appealed to. She was sorry, and she was "going to do" something for it; but inactivity followed the emotion of sorrow. Music sometimes touches every emotional chord in our natures. The mournful strings are swept, and we seem to feel, in one rapidly rising emotion, all the sorrow that any of earth's creatures has ever

known. The notes sound full and strong, and we feel that the whole world is plastic in our hands. This feeling evaporates without outcome in action. We thus habituate ourselves to emotion and desire, without acting on them. The promptings of music might result in something other than fine selfish gratification, if, fired by a noble emotion which the music aroused, we went out into the world and did noble deeds. Some power is needed to raise an emotion; but it had far better not be raised, if it does not end in action.

The results of fiction are equally bad, unless its promptings are responded to by the will. There is an oft-quoted example of a Russian lady who wept over the sufferings of a fictitious character in the play, while her coachman was freezing to death on her carriage outside the theater. There are a thousand who feel sorry for suffering, to one who acts energetically to relieve it. A maxim for every one ought to be: Never frame a good decision, never experience a glow of fine emotion, without a strong endeavor to respond by action in the proper way.

Tempering the Will along the Line of the Greatest Resistance. — Nothing schools the will, and renders it ready for effort in this complex world, better than accustoming it to face disagreeable things. Professor James advises all to do something occasionally for no other reason than that they would rather not do it, if it is nothing more than giving up a seat in a street car. He likens such effort to the insurance that a man pays on his house. He has something that he can fall back on in time of trouble. A will schooled in this way is always ready to respond, no matter how great the emergency. While another would be still crying over spilled milk,

the possessor of such a will has already begun to milk another cow.

When Napoleon found the Alps in his way, he scaled them while another general would have been lamenting the obstruction. No general ever had a more energetic and better trained will. He had it under such control, that he could enter on a line of disagreeable effort, involving great hardships, with no seeming struggle. Quick and severe effort is never easy for any one. Few have the will to undertake it, but Napoleon moved with such energy that he never failed to carry the war into the enemy's country. Even Waterloo was not fought on French soil. Julius Cæsar, Oliver Cromwell, George Washington, and all other world-famous men have been the possessors of wills that acted in the line of the greatest resistance, with as much seeming ease as if the action were agreeable.

The only way to secure such a will is to practice doing disagreeable things. There are daily opportunities. Visiting the sick furnishes an opportunity to those who dislike it. A man, who had declared his aversion to what he termed the dry facts of political economy, was one day found knitting his brow over a chapter of John Stuart Mill. When a friend expressed surprise, the man replied: "I am playing the schoolmaster with myself. I am reading this because I dislike it." Such a man has the elements of success in him. Let a person, the moment he finds a word of whose meaning or pronunciation he is not sure, start for the dictionary. He need not despise so simple an act as this, for the effort against the tendency to put off looking up a word until it is forgotten keeps the will from rusting. On the other hand, the one who habitually avoids disagreeable action is training his will to be of no use to him at a

time when supreme effort is demanded. Such a will can never elbow its way to the front in life.

Individuality and the Development of Character. — Persons of character always have well-cultivated wills. Life's duties are certain to involve doing disagreeable things, and this takes will power. An unstable man can never be a person of character. Stability is founded upon will. Stability demands the following of a definite, and often difficult, consistent line of conduct, the swerving neither to the right nor to the left. The man who is honest or punctual or diligent by fits and starts will never occupy a high place among his fellow men, for they will soon see that he lacks character. The tremendous competition in life is felt less by men of character, for there are scarcely enough of these to fill positions that demand such men. Every avenue of life is thronged by those uncertain creatures, whose conduct and actions are a mere reflection of their surroundings. Such persons waste time in drinking, card playing, or some other form of dissipation. It was announced, during the late financial depression, that a certain man had failed. "No, that is impossible," said the president of a large corporation; "his character and will power are worth a million dollars, and I shall gladly employ him if he will come to me."

Again, character demands that any certain desirable line of ideas should be kept before the mind until they dominate it. A person can have individuality only along some given line, which implies long-continued study and much mental concentration. The self is a bundle of such mental states as persist, and recur again and again. Where there is no capacity for continuous, and continually recurring, mental states, there can be no individuality, no persistent

self, no fixed character. Rattle-brained persons, gossips, and other fickle creatures cannot be properly said to have any individual self. Nor will any one acquire individuality by now studying a little mathematics, or astronomy, or geology, now skimming over a few selections of English or French literature, now beginning the study of German or drawing, but stopping the moment it becomes hard, the moment it begins to build up real individuality. It is the function of a well-trained will to adhere to a given line of conduct or ideas, until they have become an integral part of the self. Only those ideas which are so absorbed become valuable elements of the character.

We are coins, the metal of which has been dug from the mines of our inborn intellectual and moral faculties by the will power. If we properly work these mines, we may find metal enough in us to justify a stamp of a very high value. On the other hand, though there is much unmined metal beneath the surface, we often form a character marked with a penny stamp. It may be true that circumstances stamp us to a certain extent, but it is also true that the way in which we use them stamps us indelibly.

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